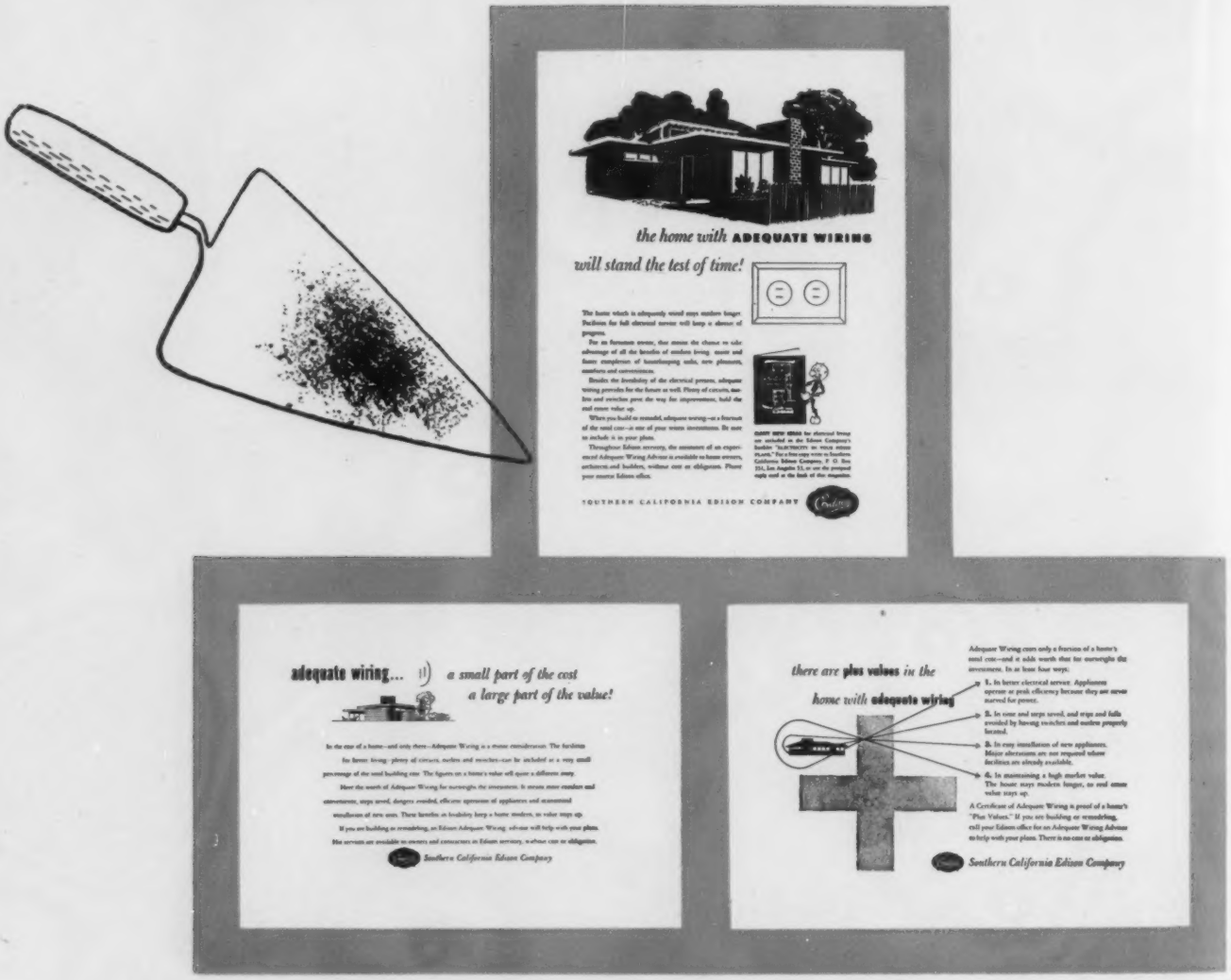
ELECTRICAL WEST

November 1948
25 cents

Why a NW-California Line?, Page 67
Appliances, Page 94

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.


the home with ADEQUATE WIRING
will stand the test of time!
SOUTHERN CALIFORNIA EDISON COMPANY
adequate wiring...
a small part of the cost
a large part of the value!
Southern California Edison Company
there are plus values in the
home with adequate wiring
Southern California Edison Company

FIRST THINGS FIRST!

In building a road, a bridge, a house, or a *sale*, a solid foundation is essential if the structure is to last. So a basic part of Edison cooperation with appliance dealers is a continuing series of advertisements on Adequate Wiring.

Adequately wired homes are your best prospects. They have the facilities for efficient, economical service from present appliances, and for easy installation of new ones. So the promotion of Adequate Wiring in homes designed for modern living is a fine start on the road to sales—a simple matter of doing first things first!

Edison SOUTHERN CALIFORNIA EDISON COMPANY

CO-ORDINATED MAGNET & FRAME DESIGN HELPS CREATE A BETTER WATTHOUR METER

J. D. SEAVER, Engineer
Meter and Instrument Laboratory
West Lynn, Massachusetts

To greatly minimize side-thrust and vibration in the new I-50 watthour meter, the damping magnets have been placed diametrically opposite each other on the periphery of the disk and as close to the electromagnet as possible. To do this, many design and manufacturing problems had to be solved.

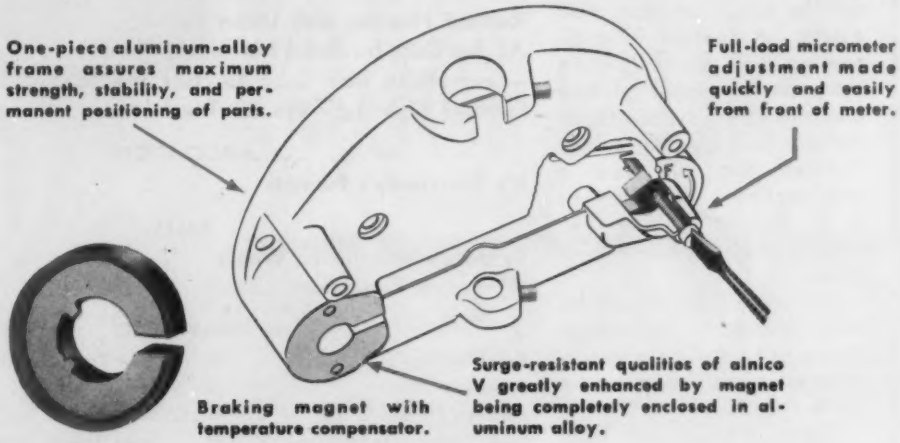
The well-known alnico V, with its high resistance to knockdown and its inherent stability, was a logical magnet alloy selection. But considerable development of special heat-treating methods was necessary to produce magnets of a usable and economical shape from this alloy—ones which would also preserve the desirable magnetic qualities inherently possible in alnico V. The I-50 magnets do. Besides their high strength, they have the extreme magnetic stability required for use in watthour meters.

The braking magnets were designed in a size and shape to permit them to be die-cast in the aluminum frame assembly. The aluminum permanently positions the magnets and provides excellent surge shielding for them as well.

All through the I-50 watthour meter are developments such as this which have brought into being what we believe to be the "first completely new watthour meter in fifty years"—one that has improved accuracy, longer life, and lower maintenance costs!

J D Seaver

Type I-50 COMBINES ACCURACY WITH LOW MAINTENANCE COSTS


One-piece aluminum-alloy frame assures maximum strength, stability, and permanent positioning of parts.
Full-load micrometer adjustment made quickly and easily from front of meter.
Braking magnet with temperature compensator.
Surge-resistant qualities of alnico V greatly enhanced by magnet being completely enclosed in aluminum alloy.

MORE NEW FEATURES

1. **Magnetically suspended moving element to do away with bearing maintenance.**
2. **Simplified registers to make reading easier.**
3. **Improved, co-ordinated insulation to assure longer life.**
4. **One-piece molded "S" base to minimize corrosion.**
5. **Simplified unit-construction for long life and low maintenance costs.**

All these features—and more—make the I-50, both in the socket- and front-connected types, a completely new meter. Benefit from the lower maintenance costs and longer life of this meter. Order from your nearest G-E Sales Representative. Or write today for Bulletin GEA-5050. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

601-29

NOVEMBER 1948

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal", "Journal of Electricity, Power and Gas" and "Journal of Electricity". Contents Copyright. Sixty-first year of publication.

ELECTRICAL WEST

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IN DECEMBER

This column is intended as a preview of important things to appear in the forthcoming issue of Electrical West. Plans do not always work out and sometimes changes must be made. Readers understand these things, we are sure. We therefore are glad that we are not heaped with criticism when a compendium on some vital industry topic is held over, or when some promised meaty morsel on a live problem is omitted.

Last month we promised to tell what happens when television comes to town. It had to be held over until December to gather last-minute information. So, look for the television story next month. A feature in engineering will be a picture story on a number of new and interesting types of substations built by P G and E. Pictures, too, will show a new rectifier substation of B. C. Electric Railway Co., using immense glass rectifier tubes.

Of special interest will be rules developed for radiant space heating where resistance wires are buried in concrete floors.

Other articles will treat with lighting in Vancouver, B. C., schools; complexity of conduit work in a large steam plant and the installation in Macy's San Francisco store.

Association reports will cover the important meetings of the PCEA held in Fresno. The news letter and sales guide, of course, will appear as usual.

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Cover photo: Installation of Uskon conducting rubber radiant heating panel. Story on page 78.

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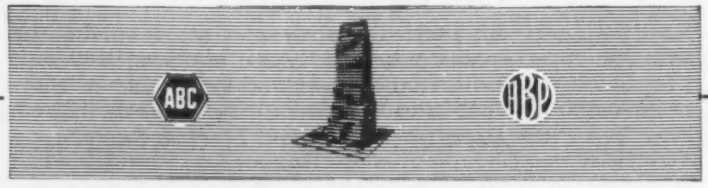

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another L-M "first"

"ELEMEX" Capacitors

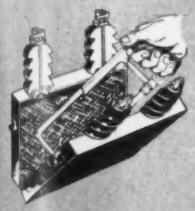
- with L-M "Lifetime" solder-sealed bushings
- in 15 *AND 25* kvar sizes in standard voltage ratings
- at NO increase in price

now in stainless steel tanks

Throw away your paint brush! Another new L-M development brings you shunt capacitors in stainless steel tanks, which *never* need painting! And at no increase in price! "Hydis" treated—colored for high heat dissipation. Plus other new features. Plus an outstanding 5-year field performance record. Negligible failures. Not a single claim of breakage in shipment. Not one claim of bushing failure for any cause whatever!

No wonder the demand for "ELEMEX" Capacitors has grown, month after month. We've had to double and redouble our production facilities every six months!

Ask the L-M Field Engineer for the story. Ask him to show you the "ELEMEX" Capacitor sawed in two . . . the stainless steel with "Hydis" treatment . . . the solder-sealed bushings . . . the "Paragroove" connectors. Ask him for the new bulletin on "ELEMEX" stainless steel capacitors. If you're in a hurry, wire collect . . . Line Material Co., Milwaukee 1, Wisconsin.



NEW — Exclusive L-M "Hydis" surface treatment—colored for high heat dissipation. Part of the metal—not a paint!

NEW — L-M "Lifetime" solder-sealed bushings keep air out, keep "ELEMEX" liquid in—permanently.

NEW — 25 kvar sizes, as well as 15 kvar, in standard voltage ratings.

NEW — Same terminal elevation above hanger for both 15 and 25 kvar sizes in each voltage rating. The 25's are two or three inches longer *below* the hanger—instantly identified from the ground. No change in leads when 15's are replaced or mixed with "ELEMEX" 25's. All sizes same width and thickness, fit same hanger bolts.

NEW — Increased production facilities to meet demand. Prompt delivery now if you orde promptly!

PROVED — Low Unit Stress! Conservative design assures long life, proved by 5-year field record.

PROVED — "Paragroove" Connectors, another L-M "first"! Wire is just dropped in and clamped; no crossing leads; no loose parts; 15's quickly replaced with 25's.

PROVED — Safer. Discharge resistors across every pack or parallel group of packs.

PROVED — *Individual* testing of packs, tanks, and completed capacitor before, during and after impregnation assures uniformity, long life.

PROVED — Continuous *individual* evacuation, drying, and capillary impregnation with "ELEMEX" non-inflammable dielectric. Continuous testing assuring precise control of power factor and capacitance of each individual capacitor. Exclusive L-M research developments.

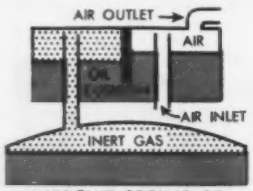
LINE MATERIAL Capacitors LM

Complete Coordinated Equipment for all Distribution Requirements

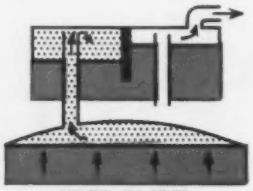
GPC Keeps pressures down when GAS PRESSURE COMPENSATED

Controls pressure

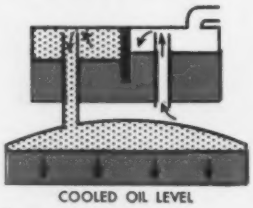
How Transformer Inert Gas Sealing System Works



Inert gas seals cooling oil from the atmosphere.



As transformer heats the transfer of gas is cushioned by change of oil levels.



As transformer cools, reverse action takes place.

TRANSFORMERS using the "Oil-Sealed" inert gas system of controlling internal pressure have been in successful operation for more than 24 years. Today, GPC Gas Pressure Compensated Cable uses a similar system to keep the internal pressure of power cables within safe limits.

Principle of Transformer Cooling System Sealed with Inert Gas

Transformer cooling oil is isolated from the atmosphere by inert gas and oil seal. As the transformer heats, the cooling oil expands, displacing inert gas from main tank to auxiliary tank. The transfer of gas is cushioned by the change in oil levels, keeping the main tank pressure low. As transformer cools the reverse takes place.

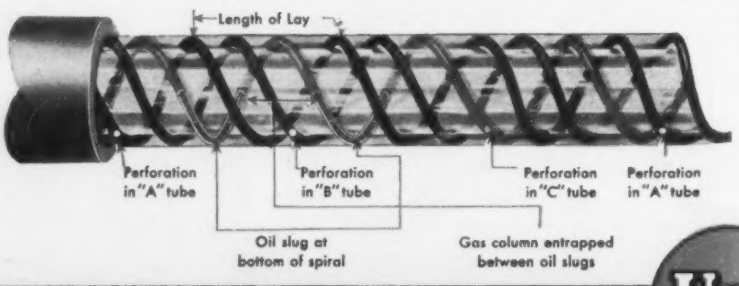
Principle of GPC Gas Pressure Compensated Cable

Like a transformer, this cable uses an inert gas, (nitrogen,) and insulating oil to keep the cable pressure within prescribed limits. The helical tubes shown in the diagram below are filled with dry nitrogen gas and are perforated at intervals. After cable installation, slugs of insulating compound collect in the low portions of the tubes while gas collects in the high portions. As the load is applied the insulating saturant (oil) expands and compresses the trapped gas which acts as a cushion to prevent development of pressures that would normally stretch the lead sheath. Upon cooling of the cable, the gas compressed in the tubes forces the oil saturant back into the cable, thus preventing wide swings from pressure to vacuum such as encountered in ordinary solid type cable.

This cable has proved highly satisfactory in use and carries heavy overloads without danger of sheath expansion. It is recommended for power plants, utilities, factories — wherever large amounts of power must be transmitted efficiently and dependably. Write for complete engineering information and installation details.

How Inert Gas Controls Pressure in GPC Gas Pressure Compensated Cable

As cable heats, gas is compressed in small tubes keeping pressure within prescribed limits.


Length of Lay
Perforation in "A" tube
Perforation in "B" tube
Perforation in "C" tube
Perforation in "A" tube
Oil slug at bottom of spiral
Gas column entrapped between oil slugs

USS

the heat is on

PAPER CABLE

like a transformer

Power transformer with inert gas seal for controlling internal pressure without exposing cooling oil to the atmosphere.

ADVANTAGES OF GPC "GAS PRESSURE COMPENSATED" CABLE

1. Insulation maintained thoroughly saturated with compound at all times.
2. Internal pressure is stabilized within prescribed limits.
3. Controlled sheath stresses. There is no repeated expansion and contraction, no fatigue or splitting of lead.
4. Pressure along cable line is uniform, not variable from joint to center of section to joint.
5. Interchangeability. Cable can be spliced to existing solid type cable without difficulty.
6. Increased current carrying capacity. Many present-day limits are based on allowable sheath stress. Type GPC Cable controls these stresses.
7. Improvement in operating voltage stress is possible, since ionization and gas inclusions are eliminated.
8. Reduced over-all transmission cost per KVA mile.
9. Continuous sheath supervision.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
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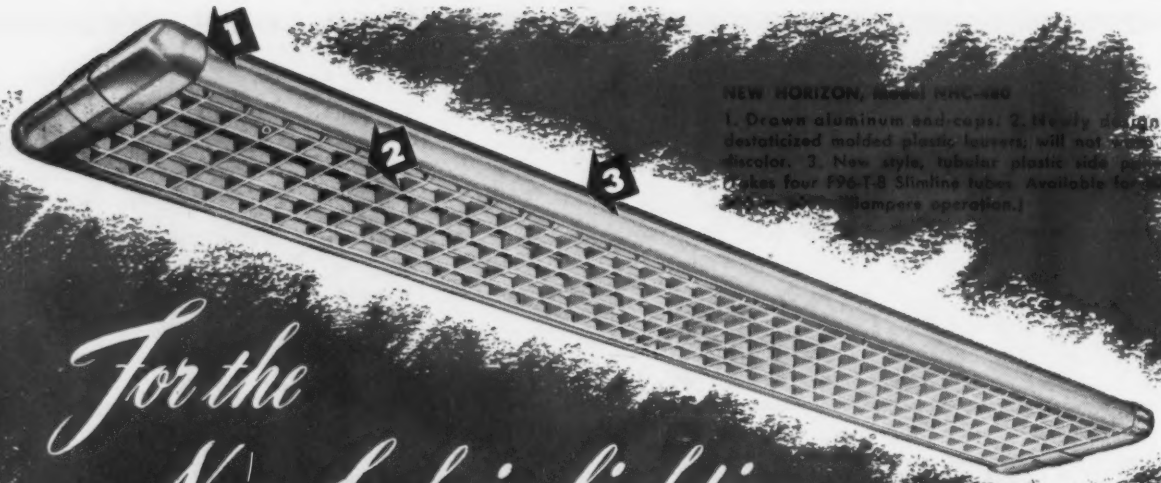
U·S·S Paper Insulated Cables

UNITED STATES STEEL



NEW HORIZON, Model NHC-480
1. Drawn aluminum end-caps. 2. Newly designed, destaticized molded plastic louvers; will not warp or discolor. 3. New style, tubular plastic side panels. Takes four F96-T-8 Slimline tubes. Available for 100, 200 or 300 milliampere operation.

For the New Look in lighting . . .

Leader

NEW HORIZON Fluorescent Fixture

● A look at *tomorrow* in luminaires: our NEW HORIZON. A slimmed-down silhouette that blends naturally and easily into smart architectural trends. But—above all—this latest of LEADERS has these definite operational advantages:

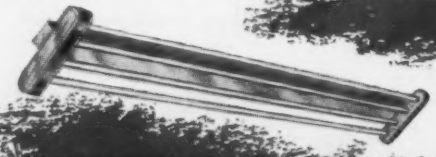
The beautiful NEW HORIZON (nesting instant-start Slimline lamps) is *easy to install . . . easy to service . . . releases more light with less surface glare.* And it gives its abundance of light longer . . . at *lower maintenance costs.*

For full information on the carefully-conceived advantages of the *New Horizon* series, write today.

A STEP AHEAD LEADER ELECTRIC COMPANY

LEADER ELECTRIC COMPANY

3500 NORTH KEDZIE • CHICAGO 18, ILL. • West Coast factory: 2040 E. 15th St. • Oakland 6, Calif.



Leader NEW HORIZON Open Type Fixture—especially designed for mass lighting of large establishments. Available in one lamp (NHO-380), two lamp (NHO-[illegible]) and three lamp (NHO-380) and four lamp (NHO-480) installation; 100, 200 or 300 milliampere operation.

The NEW HORIZON Incandescent Spotlight. Excellent for highlighting displays. Available for corner installations (Cat. No. LS-40) or between fixtures in continuous runs (Cat. No. LS-70).

UNITED STATES RUBBER COMPANY

SERVING THROUGH SCIENCE

HIGH TENSILE STRENGTH

That's Security Friction Tape!

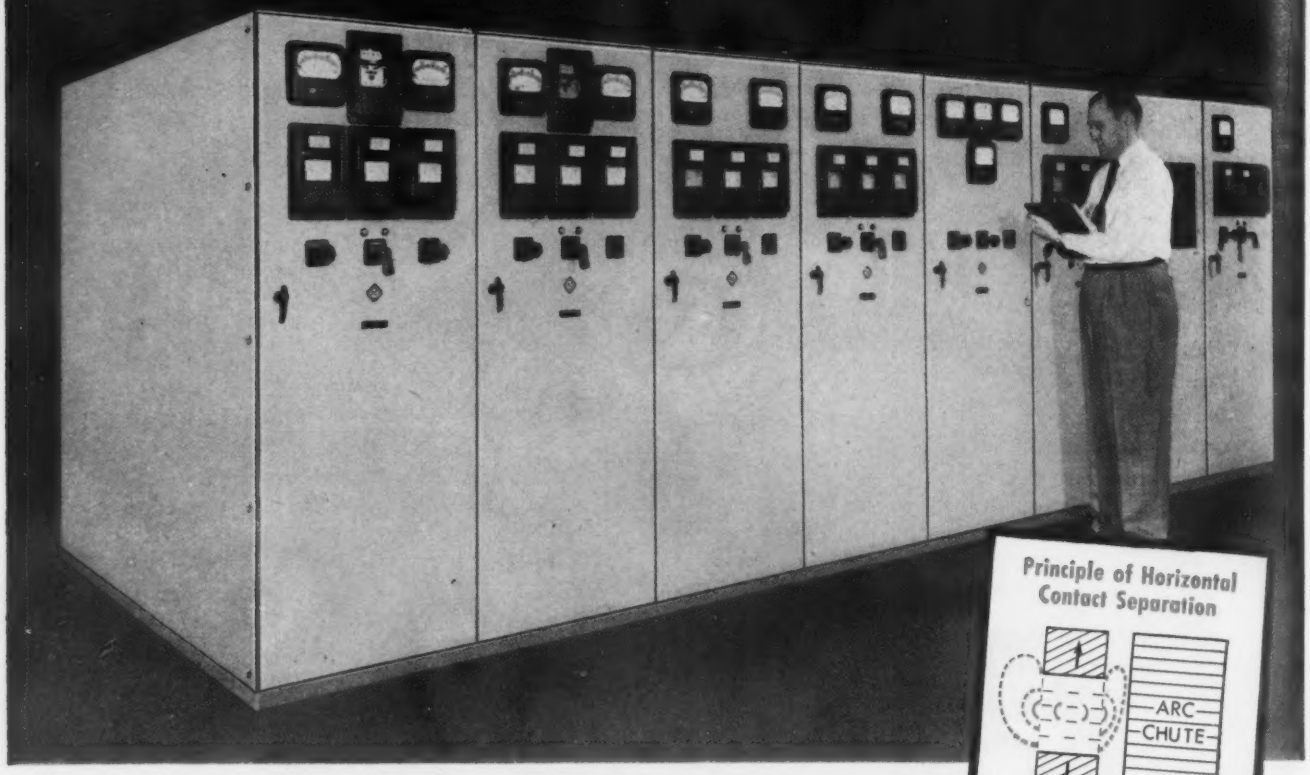
Security's high tensile strength comes in handy on the tougher jobs. This electrical and general purpose tape has no pin holes—does not ravel when unwound from the roll —tears straight. Highly di-electric, Security Friction Tape has a strong, rubbery adhesive that *sticks and holds.* In factory, office or home, Security can help you in dozens of ways.

Play Safe-Use Security

UNITED STATES RUBBER COMPANY

1230 Avenue of the Americas, New York 20, N. Y.

ALLIS-CHALMERS METAL-CLAD SWITCHGEAR



Horizontal Arc Interruption

Gives You Long Contact Life, Positive Interruption, Easy Contact Inspection

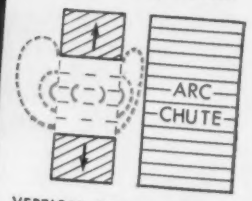
IN A RECENT SURVEY, engineers named horizontal arc interruption as a top feature of Allis-Chalmers metal-clad switchgear. It's easy to see why.

Horizontal arc interruption minimizes contact burning, adds contact life, because arc is forced up and away from the contact points. You can be sure of positive interruption because the arc itself generates the heat to create the natural thermal effect that assists arc into arc chute. Contacts are easily inspected by removing bolts and raising arc chute.

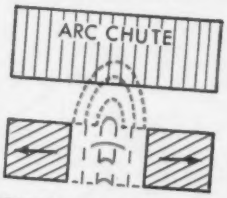
This kind of sound engineering throughout A-C switchgear insures the first requirement of protective electrical equipment — dependability. For more information, write: ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2490

Principle of Horizontal Contact Separation



VERTICAL SEPARATION . . . Heated gases are not readily removed from area of insulating break. A complex interrupting system is required to blow arc into arc chute.



HORIZONTAL SEPARATION . . . A natural thermal effect assists the arc into the arc chute. Natural forces accelerate the dissipation of gas from around the break area.

HERE ARE 5 OTHER PREFERRED FEATURES:

RUGGED CONSTRUCTION . . . rigid, self-supporting structure of steel angles and formed plates is lap-welded. Only two full length channels required for simple four point support. Result: only four point alignment necessary.

A-C DESIGNED arcing contacts of high melting point alloys minimize burning, assure low maintenance, long life under repetitive duty.

CONTACT FINGERS on removable element permits easy inspection and maintenance without de-energizing the main bus.

PREDICTABLE low installation costs . . . unit is "packaged" ready for connection. Detailed drawings provided for each installation.

ADEQUATE BUS INSULATION . . . no-corona tape, bakelized paper tubing, insulating tape eliminates compound-filled joints. Easily installed in field and removed for installation changes.

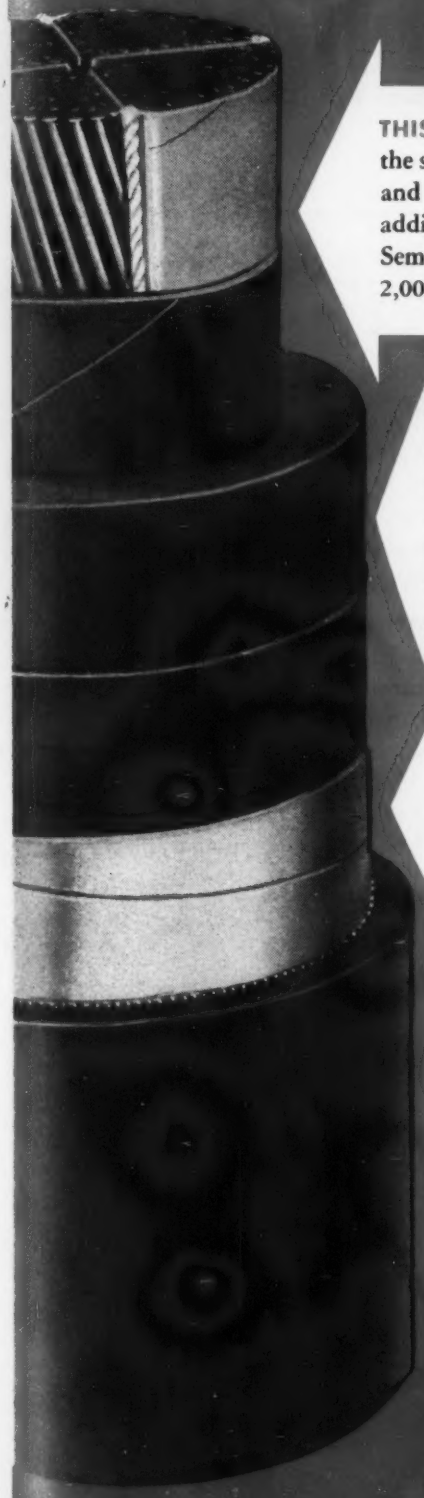
ALLIS-CHALMERS builds these circuit breakers: Air Blast, *Ruptair* magnetic air, *Ruptor* oil units, Low Voltage.

Ruptair and *Ruptor* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

FACTS POINT TO
OKOLITE-OKOPRENE
FOR GENERATOR LEADS



THIS IS A SEGMENTAL CONDUCTOR. A 1,750,000 CM segmental conductor carries the same load as a 2,000,000 CM concentric conductor, costs less in all but short lengths, and is equally flexible, its improved design utilizing segment interstice fillers and additional tapes. Conductor: Okoloy-coated to prevent corrosion and shielded by Semicon tapes to prevent internal corona cutting on all cables operated at more than 2,000 volts between phases.

THIS IS A HEAVY WALL OF OKOLITE INSULATION. Moisture, ozone and heat-resistant, Okolite insulation has proved its stable electrical characteristics in voltages as high as 38 KV. Okolite has high dielectric strength and low power factor. Okolite-shielded-Okoprene cables are easy to terminate and contain no saturants or petrolatum to migrate, leak or give pressure trouble.

THIS IS METALLIC SHIELDING TAPE, insuring freedom from static discharge, preventing shock from accidental contact. Superior to semi-conducting braids in this respect.

THIS IS A NON-METALLIC SHEATH OF OKOPRENE, a tough, non-flammable neoprene covering developed by Okonite, which is unaffected by exposure to sunlight, weather, chemicals and fumes. Okolite-shielded-Okoprene construction eliminates lead sheath troubles due to corrosion, mechanical damage during installation, or fatigue.

In addition to serving for generator and transformer leads and station feeders, there are cables of Okolite-Okoprene construction for all control, lighting, power and switchboard circuits . . . cables to be laid in ducts or troughs, buried direct or wherever condensation exists . . . cables for boiler rooms, tunnels and other hot locations. Write for Bulletin WE-2073, "Why Stations Have Standardized on Okolite-Okoprene Cables." Address The Okonite Company, Passaic, New Jersey.

OKONITE insulated wires and cables

THE BEST CABLE IS YOUR BEST POLICY

Pawtucket serves a 1725-KW

For low-cost dependability and flexibility—today and tomorrow

Many people think of secondary networks as suitable only for very large loads, covering a sizable area, and arranged in a conventional grid pattern. Yet here is a case where an initial network will supply an area with a total peak load of 1725 kilowatts—and with the secondary mains confined essentially to a 600-foot portion of a single street.

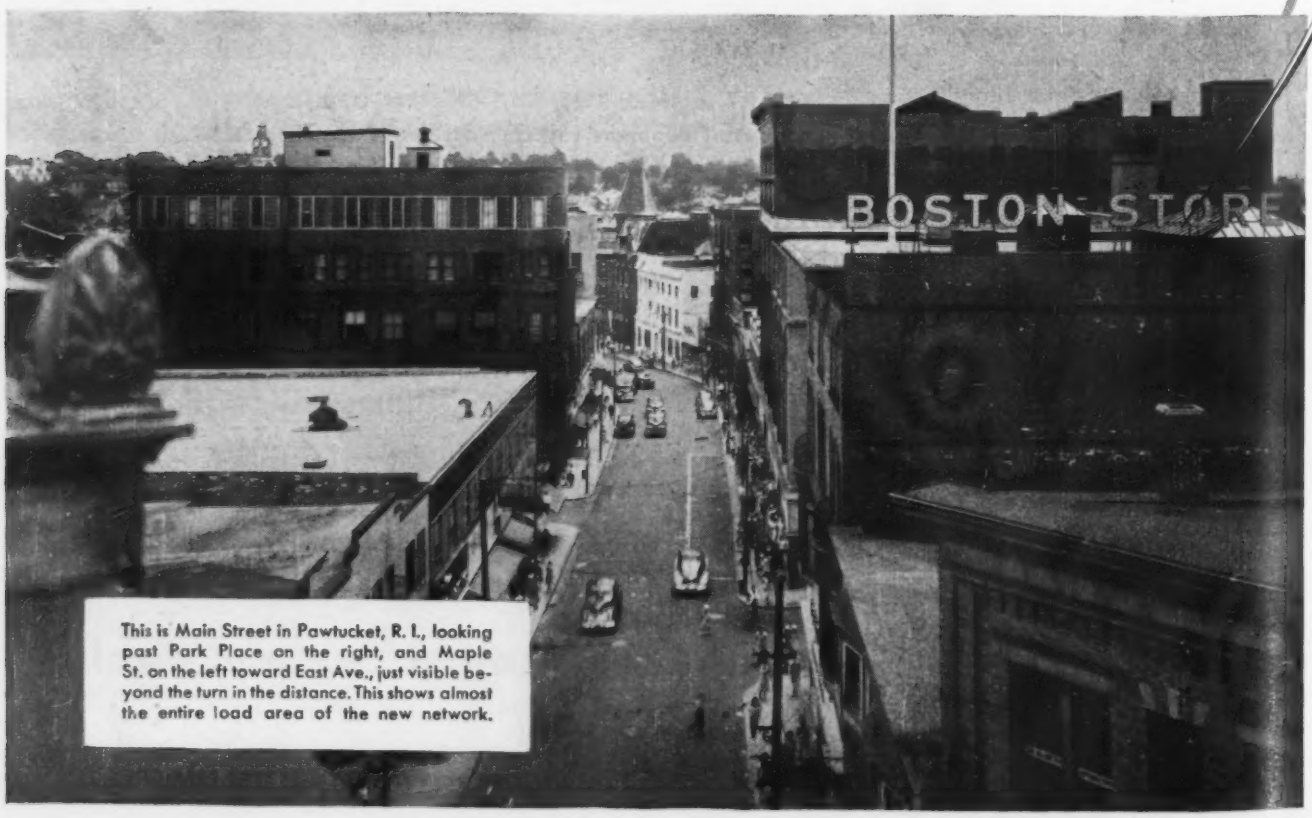
The city is Pawtucket, R. I., served by the Blackstone Valley Gas and Electric Company. The installation, as originally engineered, involved a two-block business district on Main Street, between High and North Union.

Load growth was the problem

This portion of the business district has been served by a radial system, principally underground. There are thirteen grouped loads to be served—with peak requirements from 40 to 240 kw. With buildings recently modernized, three recently air conditioned, it seemed only a matter of time before growing load would make the present radial system inadequate.

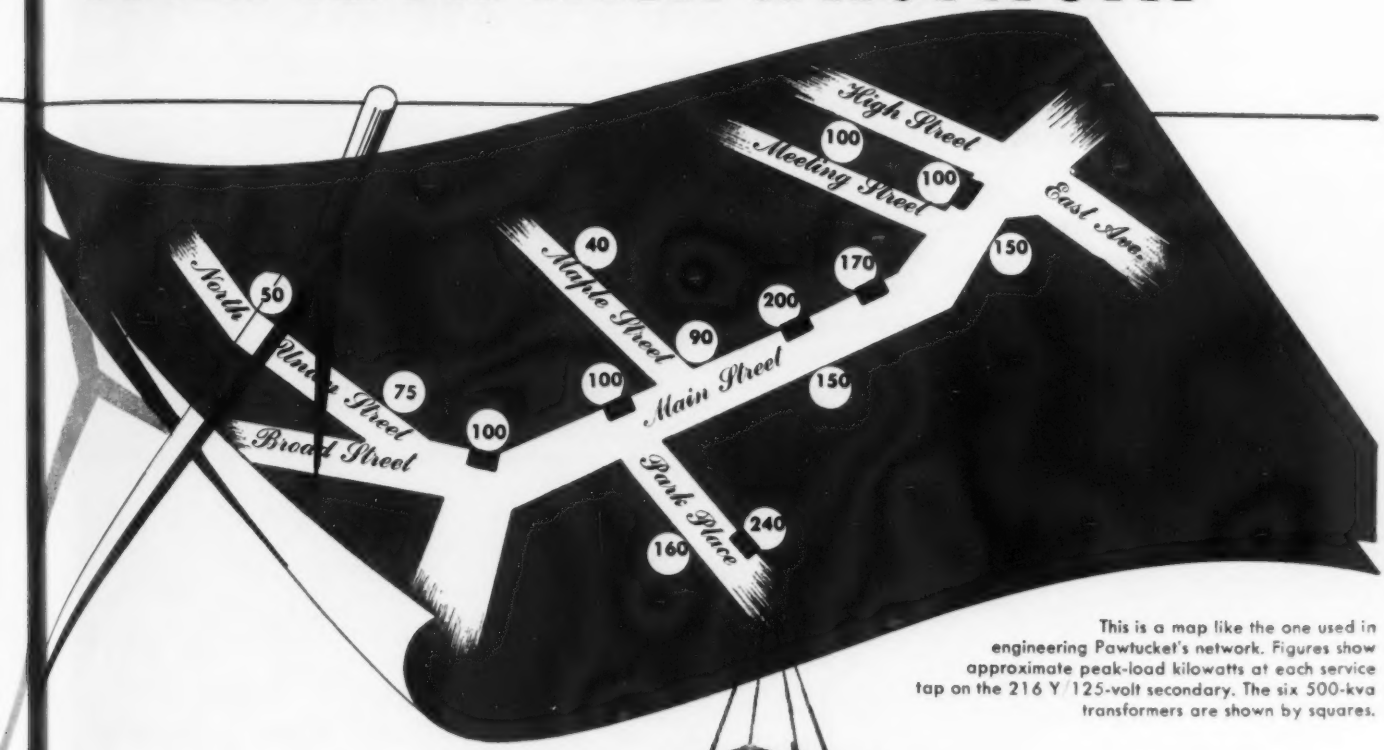
A network proved practical

The situation seemed to call for a network, and study proved that all requirements of an ideal network could be met economically—including proper loading of transformers and cables during both normal and abnormal conditions, while maintaining close voltage tolerances. Three 14,400-volt primary feeders were used with six 500-kva standardized network units—trans-



This is Main Street in Pawtucket, R. I., looking past Park Place on the right, and Maple St. on the left toward East Ave., just visible beyond the turn in the distance. This shows almost the entire load area of the new network.

load area with a network



This is a map like the one used in engineering Pawtucket's network. Figures show approximate peak-load kilowatts at each service tap on the 216 Y/125-volt secondary. The six 500-kva transformers are shown by squares.

formers and protectors. This gave a load-to-transformer ratio of 57.5%—about average for initial network installations.

Present load can increase seven-fold without adding primary feeders or increasing size of secondary mains

With an initial transformer loading of less than 60%, this installation will provide full network flexibility. Some increase—and shifting—in load can be handled with no excessive overload, even with one feeder out of service.

As load grows, it will, of course, be necessary to add transformers. However, no additional primary feeders will be required, and the size of secondary mains need not be increased. New loads within the present area will be handled by tapping into the present secondary network. New transformers will be tapped into existing primary feeders and tied into the existing secondary.

Present plans call for extending the network to include ten rather than six transformers and to cover three blocks rather than two.

Pawtucket gained by selecting standardized G-E transformers and protectors—cut delivery time, saved money over the cost of non-standard designs.

This installation brings out one of the big advantages of the secondary network—how, for high-quality service, it is the simplest and least expensive system to expand, the ideal system to meet growing loads. For additional information—and a copy of a new leaflet on secondary networks (GET-1487)—call your G-E representative or write Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

402-75

CRESCENT

IMPERVEX TRENCHWIRE

For Lowest Cost Underground Use

● CRESCENT IMPERVEX TRENCHWIRE provides the LOWEST COST, PERMANENT underground installation for services from power line to meter, for connecting several buildings from the same service, as on FARMS, ESTATES and INSTITUTIONS and for STREET, AIRPORT, BALL PARK, DRIVE-IN THEATRES, and other outdoor lighting and power circuits. Also extensively used by INDUSTRY in ducts for underground power circuits.

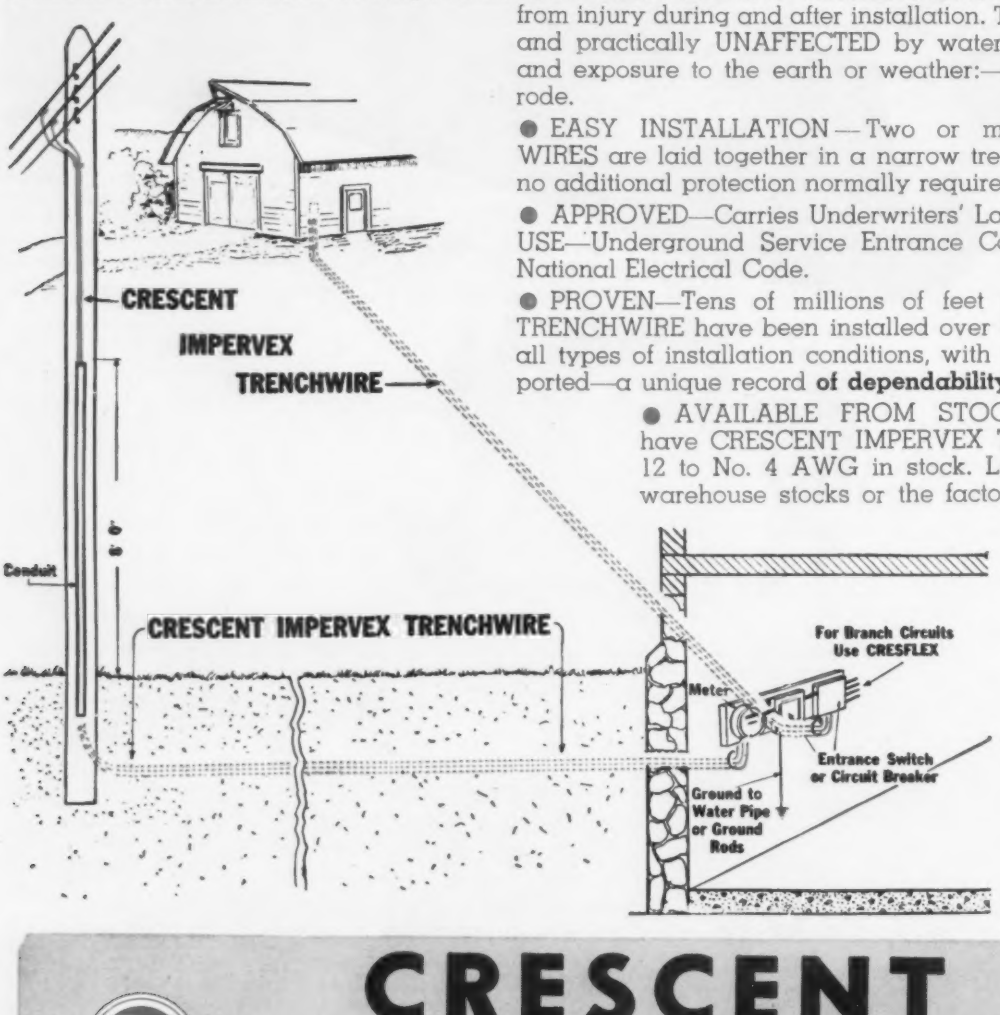
● CONSTRUCTION—The single copper conductor is insulated with IMPERVEX special moisture and heat-resisting rubber insulation. A tough NEOPRENE armor sheath is vulcanized over the insulation, protecting it from injury during and after installation. The cable is flame-retarding and practically UNAFFECTED by water, oil, acid, alkali, sunlight and exposure to the earth or weather:—nothing to rot, rust or corrode.

● EASY INSTALLATION—Two or more IMPERVEX TRENCHWIRES are laid together in a narrow trench to form the cable with no additional protection normally required.

● APPROVED—Carries Underwriters' Laboratories' Labels as TYPE USE—Underground Service Entrance Cable, and conforms to the National Electrical Code.

● PROVEN—Tens of millions of feet of CRESCENT IMPERVEX TRENCHWIRE have been installed over the last seven years under all types of installation conditions, with not one case of failure reported—a unique record **of dependability!**

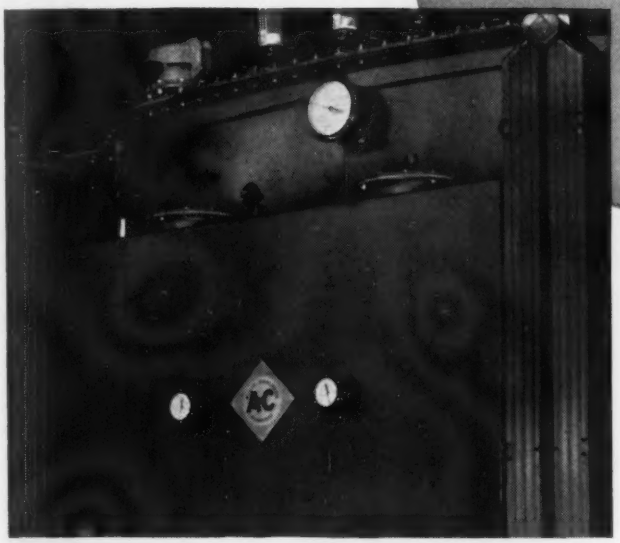
● AVAILABLE FROM STOCK—Electrical wholesalers have CRESCENT IMPERVEX TRENCHWIRE in sizes No. 12 to No. 4 AWG in stock. Larger sizes available from warehouse stocks or the factory.



● BULLETIN No. 451 giving technical information on selection of proper size of conductor, etc. will be furnished on request.

CRESCENT
WIRE & CABLE
CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

No More Pressure than in a Toy Balloon!



The same 1 pound pressure in a toy balloon . . . is all that's in *Oil-Sealed* Inert Gas System for Allis-Chalmers Transformers!

NO OTHER TRANSFORMER inert gas system operates at such low pressure. And to you that can mean — safety, low pressure on gaskets — low gasket maintenance!

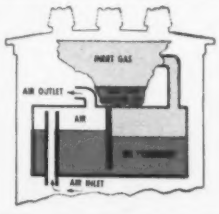
In addition, the system is tops for simplicity! It has no moving parts; no sensitive gauges or reduction valves; it doesn't require periodic replenishment of nitrogen; no bottles to buy!

Originated by A-C in 1923, this system is now standard for over 5,000,000 kva of U. S. Power! For more information call your nearby A-C sales representative, or write ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN. *Oil-Sealed* is an Allis-Chalmers trademark.

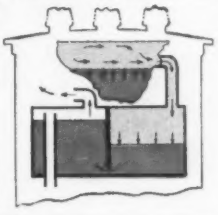
A 2497

SIMPLE AS A-B-C

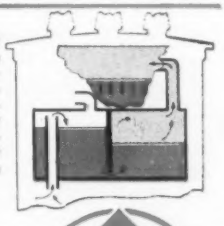
A PRINCIPLE — Transformer cooling oil is isolated from the atmosphere by inert gas and oil seal. This prevents sludge formation and fire hazard due to oxygen. By excluding moisture the system maintains high dielectric quality of oil.



B AS TRANSFORMER HEATS, the cooling oil expands, displacing inert gas from main tank to auxiliary tank. The transfer of gas to the auxiliary tank is cushioned by the change of oil levels as shown, keeping the main tank pressure low.



C AS TRANSFORMER COOLS, the reverse takes place. In this simple manner inert gas protection is provided automatically . . . transformer oil adjusts itself to changing temperatures without being exposed to the atmosphere.

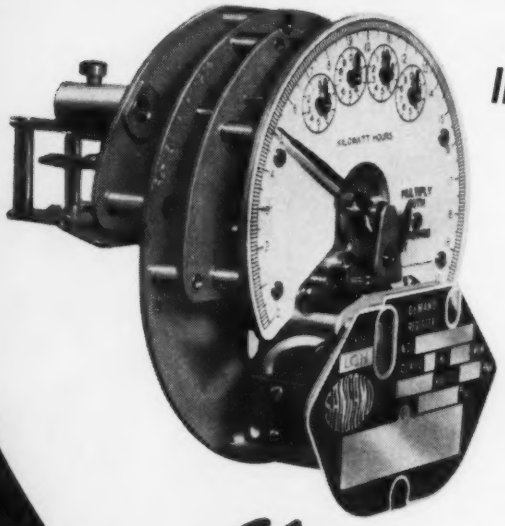


ALLIS-CHALMERS

Originators of the "Oil-Sealed" Inert Gas System!

LINE
LOAD

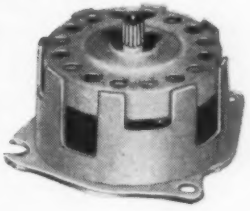
-Demand Measurement



Improved Sangamo Type LCH Demand Register with New Long-Life, Low-Speed Motor

Sangamo LCH Demand Registers contain the same timing cam and gravity reset principle used so successfully for the past fifteen years in all Sangamo Demand Registers. The new dependable hysteresis motor insures even longer trouble free service without attention.

New HYSTERESIS TYPE MOTOR



The new low-speed Sangamo-developed, hysteresis type motor—the heart of the Type LCH Demand Register—achieves higher torque, both in starting and synchronous operation. The motor coil is completely enclosed in a molded shell for superior insulation. A new replaceable bearing system is lubricated with a special Silicone product which is not affected by extremes of temperature. The features of this new motor—greater torque . . . low speed: 450 RPM . . . long-life lubrication—assure exceptionally long life without attention.

WRITE FOR
SANGAMO BULLETIN 321

Full information concerning the construction of Sangamo Type LCH Demand Registers is contained in Bulletin 321, sent without obligation.

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD • ILLINOIS

SANGAMO

SM 485

UNION PACIFIC

The Governor of Montana invites You

State of Montana
Office of The Governor
Helena

SAM C. FORD
GOVERNOR

To American Industry:

Montana has developed only the most obvious of its many resources in the agricultural, lumbering and extractive industries.

Our state agencies, industrialists and businessmen, working through the Industrial Development Division of the Montana Chamber of Commerce, are ready to help prospective industries. We have prepared for your inspection exhaustive briefs on the following: Coal Chemicals, Plywood, Pulpwood, Wool Processing, Chinaware, Phosphates, Travertine, Corundum, Oil By-products, Paint Pigments and Metal Fabrication.

Outstanding advantages are low-cost Hydro-electric Power, Natural Gas and Coal, intelligent labor, superb natural surroundings, an invigorating climate and a relaxed, Western way of life.

On behalf of my fellow Montanans, you are invited to make this pleasant land—the Treasure State—your home and your future.

Cordially yours,

Sam C. Ford

Governor

Sam C. Ford

* One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.

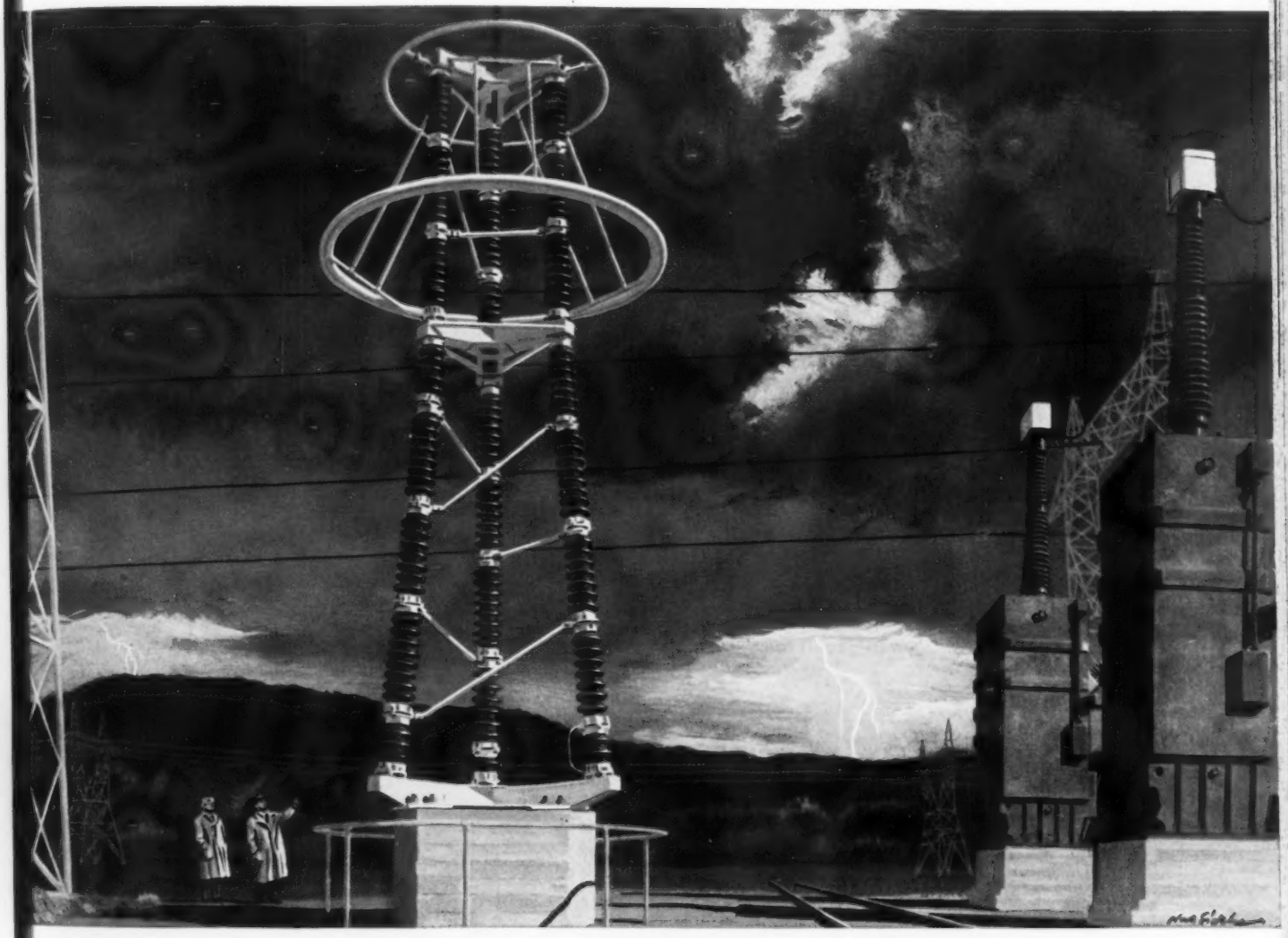
Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

*Address Industrial Department, Union Pacific Railroad
Omaha 2, Nebraska

UNION PACIFIC RAILROAD

Road of the Daily Streamliners

YOU CAN BE SURE..IF IT'S Westinghouse



HALF-MILLION VOLT "TRAFFIC COP"

Power engineers, with the cooperation of Westinghouse, are now testing out a great new "electrical superhighway". Along it race 500,000 volts—almost *twice* the voltage carried by any transmission line today.

It may well change the whole geography of power in the U.S.A., by developing ways to transmit large amounts of power more efficiently and economically than ever before.

You have to be *sure* when you deal with big power at 500,000 volts. That's why Westinghouse was called on to design and build not only this half-million volt lightning arrester, but the world's highest-voltage power transformers and other vital equipment.

This kind of confidence is the reason your local power company depends on Westinghouse, too, for much of the equipment that supplies and protects power for your home or factory.

MAKER OF THE BROADEST LINE OF ELECTRICAL EQUIPMENT

A 66⅔% INCREASE IN CAPACITY
...AN 11% REDUCTION IN WEIGHT PER KVAR
...AT THE SAME PRICE PER KVAR

IT'S THE NEW WESTINGHOUSE

25 kvar Inerteen Capacitor

Identical mounting dimensions and only slightly greater physical size are illustrated in this comparison view of the new 25-kvar capacitor with 15-kvar units of the same voltage ratings. (Left, 7,200 volts; right, 2,400 volts.)

Here's something you've been waiting for . . . the new Westinghouse 25-kvar, distribution-type capacitor. Here is extra capacity for power-factor correction . . . for limiting line current to that producing revenue. In addition, you get the same features that contribute to the superiority of the 15-kvar design.

The new capacitor, while slightly larger than the 15-kvar unit, is actually 11% lighter per kvar and can be used interchangeably with 15-kvar units in the new standard one, two and four-unit hangers. Identical dimensions, from mounting lug to line terminals on both ratings, facilitate interconnections when mounted in same hangers.

The new unit is furnished for pole or structural mounting and will permit installations of greater capacity with lower cost per kvar for hangers, protective equipment and labor. To match other outdoor equipment, the new 25-kvar unit has a dark gray finish over the zinc-spray protective coating.

For more information, ask for D.B. 49-165. Call your nearest Westinghouse office or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60665

...with these time proved features!

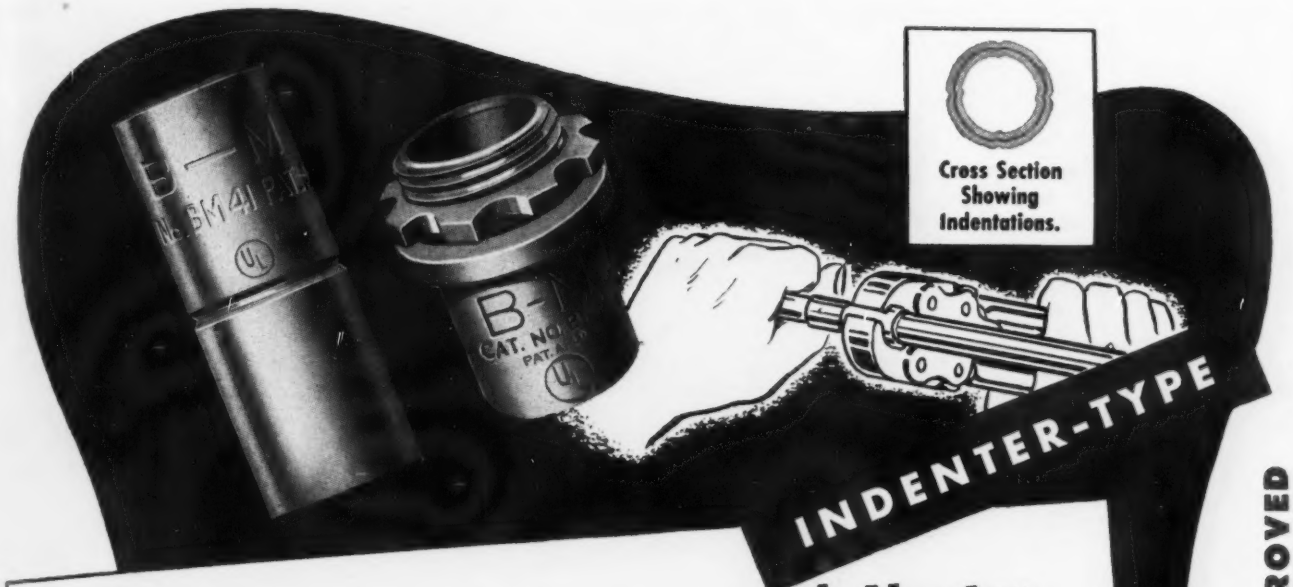
- ★ **Inertex Insulating Paper**
- ★ **Inerteen Impregnation**
- ★ **Solder-Sealed Porcelain Bushings**
- ★ **Durable All-Welded Steel Cases**
- ★ **Weatherproof Zinc-Spray Finish**

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

INERTEEN CAPACITORS

Made in the WEST . . . for the WEST



Install E. M. T. Faster and Neater with BRIEGEL Thin-Wall Fittings

NEATER • FASTER • STRONGER • APPROVED

All B-M Fittings Carry the Underwriters' Seal of Approval

FOR faster, neater and stronger thin wall conduit connections insist on either Briegel Indenter or Twiston Briegel Self-threading type all steel, one piece connectors and couplings.

B-M Indenter fittings, the only approved couplings and connectors of this type, have long enjoyed wider use and application than any other method of installing E.M.T.

The new B-M Twiston Self-threading fittings now make it possible to have threaded, raintight E. M. T. connections without the use of dies. Two complete turns with a pair of pliers threads the tubing and screws the fittings into a locked position, which results in the strongest connection possible and one that will withstand severe vibration.

Whatever the thin wall job might be, you will find that you can do it neater, faster and better with Briegel UL Approved E.M.T. fittings.

BRIEGEL METHOD TOOL CO.

GALVA, ILLINOIS

DISTRIBUTED BY

The M. B. Austin Co., Northbrook, Ill. Clifton Conduit Co., Jersey City, N.J. The Steelduct Co., Youngstown, Ohio Nat. Enameling & Mfg. Co., Pittsburgh Clayton Mark & Co., Evanston, Ill. Gen. Electric Co., Bridgeport, Conn. Enameled Metals, Pittsburgh, Penn. Kondu Mfg. Co., Ltd., Preston, Ontario

• Those little starters in your fluorescent fixtures are very important to the satisfactory performance of your lighting.

Certified Starters give you best lighting performance because they are made to exacting specifications. Then Electrical Testing Laboratories, Inc., an impartial judge, tests and checks them to assure they conform.

If you want better performance, full lamp life, long starter life and lower maintenance costs, insist on Certified Starters—the ones with the Certified shield on the case and on each starter.

CERTIFIED
E·T·L

• *To be sure you get Certified Starters, look for the Certified shield on the case and on each starter.*

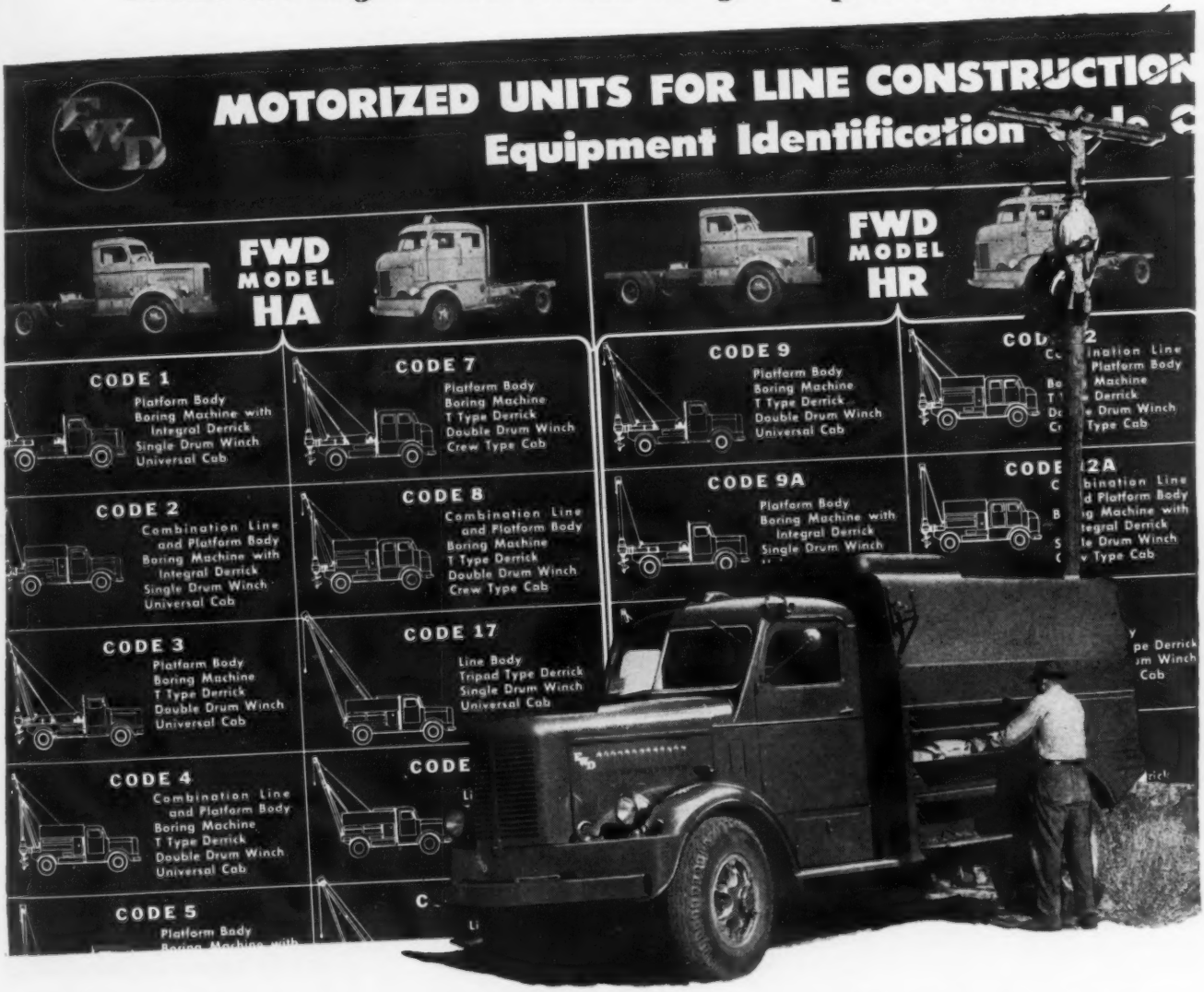
Address inquiries to any of the following manufacturers of

Certified Starters

The Arrow-Hart & Hegeman Co., Hartford, Conn.
The Bryant Electric Co., Bridgeport, Conn.
Dura Electric Lamp Co., Newark, N. J.
General Electric Co., Bridgeport, Conn.
Harvey Hubbell, Inc., Bridgeport., Conn.
Ironbound Operating Co., Newark 2, N. J.
Kuthe Laboratories, Inc., Newark, N. J.
The Lloyd Products Co., Providence, R. I.
Pass & Seymour Co., Syracuse, N. Y.
Sheldon Electric Co., Irvington, N. J.
Instant Glow Starter Corporation, New York, N.Y.

One Unit! One Order! One Responsibility!

That's How Easy . . . How Sure . . . it is when you use FWD's simple BUILT-TO-CODE Chart to select the Right FWD Truck for your Specific Needs



JUST imagine the time you save . . . the trouble you by-pass when you select a *built-to-code* unit for line construction or maintenance work with the help of FWD's handy code chart.

You quickly see the 38 varying — yet standardized — combinations that are available and the specific equipment each FWD carries.

You easily order the FWD you want because each unit is designated by an individual code number.

You issue only one order because FWD engineers and builds the *complete* unit — truck and equipment. That's why — when your FWD is delivered — it's ready to go to work immediately.

What's more — with FWD supplying the complete unit — buck-passing is eliminated. FWD accepts full responsibility.

Let FWD's code chart help simplify your equipment purchases. See your Graybar distributor or write us direct.

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory: KITCHENER, ONTARIO

Built-to-Code
MOTORIZED UNITS
FOR LINE CONSTRUCTION AND MAINTENANCE

Built By

Makers of America's Foremost Heavy Duty Truck

Distributed by GRAYBAR

COUNT 11 and

Get Reliable . . . Long Life Breaker Operation!

MAINTAIN YOUR STANDARDS of service with "5-20" or "3-20" performance . . . interruption in 5 or 3 cycles, reclosing in 20! You get that protection in ratings 115 kv and higher by installing Allis-Chalmers improved BZO-160 oil circuit breakers.

REDUCES CONTACT MAINTENANCE

TWO *RUPTOR* interrupters assure fast, positive interruption! They are based on standard Allis-Chalmers design known for low arc energy interruption that means long contact life and low oil deterioration. Simple design, free of complicated mechanisms and serious alignment problems, permits quick contact inspection.

IMPROVED HIGH SPEED PNEUMATIC OPERATOR, with fast magnetic trip, aids high speed contact separation . . . provides 20-cycle reclosing that helps you maintain better service continuity and system stability. It is mechanically trip-free . . . assures instantaneous reopening should breaker close on a fault!

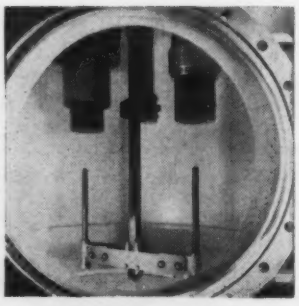
BUILT FOR LONG LIFE

CAREFULLY SELECTED MATERIALS for all parts, from tanks to contacts, minimize chance for mechanical failures . . . reduce number of routine inspections.

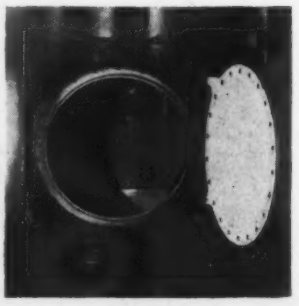
For more complete information on the BZO-160 outdoor oil circuit breaker, contact your nearby A-C office for literature, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS.

Ruptor is an Allis-Chalmers trademark. A 2347

1 ***RUPTOR*** **INTERRUPTERS are easily dismantled for inspection when necessary . . . as indicated by condition of bayonet contact tips.**



2 **STURDY TANKS have large manholes with hinged covers . . . means easy access to tank interior and *Ruptor* interrupters.**



Save 2 Ways!

1. Simplified contact groups speed contact inspections.

2. Large manhole with hinged cover permits easy access to tank interior.

3. Double-hinged doors uncover operator and allied equipment on 3 sides.

4. Removable hood allows speedy adjustments of pole unit mechanism and transformer connections.

5. Bushing transformers in wells . . . removed from top or down through tank without removing bushings.

6. Fill valve (top) and combined drain and sampling valve for oil handling.

7. Sealed bushings maintain initial high dielectric strength . . . need only periodic external inspection and cleaning.

8. Float-type oil gauge eliminates leakage.

9. Openings permit inspection and cleaning under tanks.

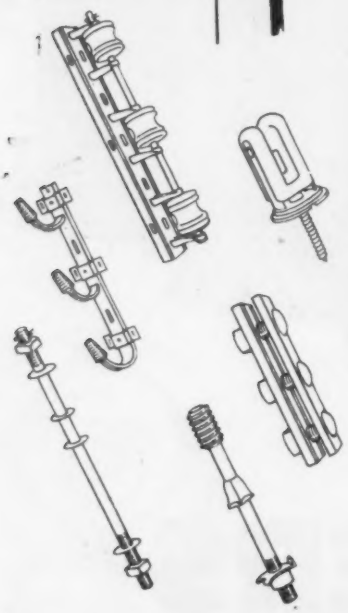
10. Contact position indicator mechanically connected to contact rod.

11. All-around weather protection guards breaker inside and out.

Call Allis-Chalmers for power circuit breakers — in standard ASA ratings . . . Indoor and Outdoor!

ALLIS-CHALMERS

Pioneers in Power and Electrical Equipment From Generation Through Utilization



with Dependable Oliver Pole Line Materials

Use the dependability of Oliver Pole Line Materials to insure the permanence of your new line construction. Oliver quality is founded upon sound engineering design, carefully selected materials, skillful manufacture and careful inspection. The Oliver Line is complete, and the items readily available from your electrical wholesaler.

• You are making a good decision when you standardize on Oliver Pole Line Materials.

OLIVER
IRON AND STEEL
CORPORATION

South Tenth and Muriel Streets • Pittsburgh 3, Pa.

Going Great — where the going's tough

With several years of industry acceptance to back it—with a successful on-the-job record behind it, General Electric Thermoplastic Type TW wire has become a standard for permanently wet spots. Yes, G-E Type TW is a full-grown, code-accepted wire, with a record that shows it's going great where the going's tough.

Small-diameter Thermoplastic Type TW wire is proving every day that it can be used in permanently wet locations on jobs of all types. Underground—in concrete slabs or other masonry in direct contact with the earth—in locations where moisture is likely within the raceway, Thermoplastic Type TW does the job, and does it well.

When the going's tough, make sure that the job's done right with General Electric Thermoplastic Type TW wire. You'll like the way it does the job. You'll like the way it helps do your job, because it's easy to strip, easy to pull, clean to work with. Specify it by name—General Electric Thermoplastic Type TW wire.

For more information, write for the new, free booklet, *Building Wires, Cords, and Cables for every purpose,* to Section W14-1125 Construction Materials Department, General Electric Company, Bridgeport 2, Conn.

GENERAL ELECTRIC

AROUND THE CIRCUIT WITH YOUR G-E MERCHANDISE DISTRIBUTOR

SUPER PVX* nonmetallic-sheathed cable is the new development that's still creating a stir in the contracting field. *Good-looking,* it's a beauty for exposed wiring anywhere. Smooth brown or ivory finish makes it right for even the top-quality residential jobs. Its *tough* thermoplastic sheath and *rotproof* thermoplastic insulation make it a natural for fighting fumes and moisture in barns and other troublesome locations. Ask your General Electric merchandise distributor about SUPER PVX.

MACHINE TOOLS can't maintain a high production rate when portable cords are constantly breaking down. General Electric Flamenol* portable cords are made to keep tools on the job in spite of hard use. Thermoplastic jacket resists acids, oils, water, alkalies, and sunlight. Use them for replacements wherever tools have got to stay on the job.

LIGHTWEIGHT BX* armored cable with bonding strip in sizes 12 and 14 speeds construction because of weight reduction and increased ease of installation. These two new constructions and the rest of the General Electric BX armored cable line are still the old stand-bys for construction that goes in to last.

THE FULL LINE of General Electric wires, cords, and cables gives you a wide range of materials to choose from. For information on any part of the line, why not contact your General Electric merchandise distributor? He'll be glad to straighten out your supply problems, or simply give you how-to-do-it wiring facts.

*Trade-mark Reg. U. S. Pat. Off.

IT'S *in the* BAG

A POSITIVE CORROSION-PROOF *Splice*

Reliable Straightline Splices are now loaded with a neutral, all weather temperature grease which seals joints against corrosion.

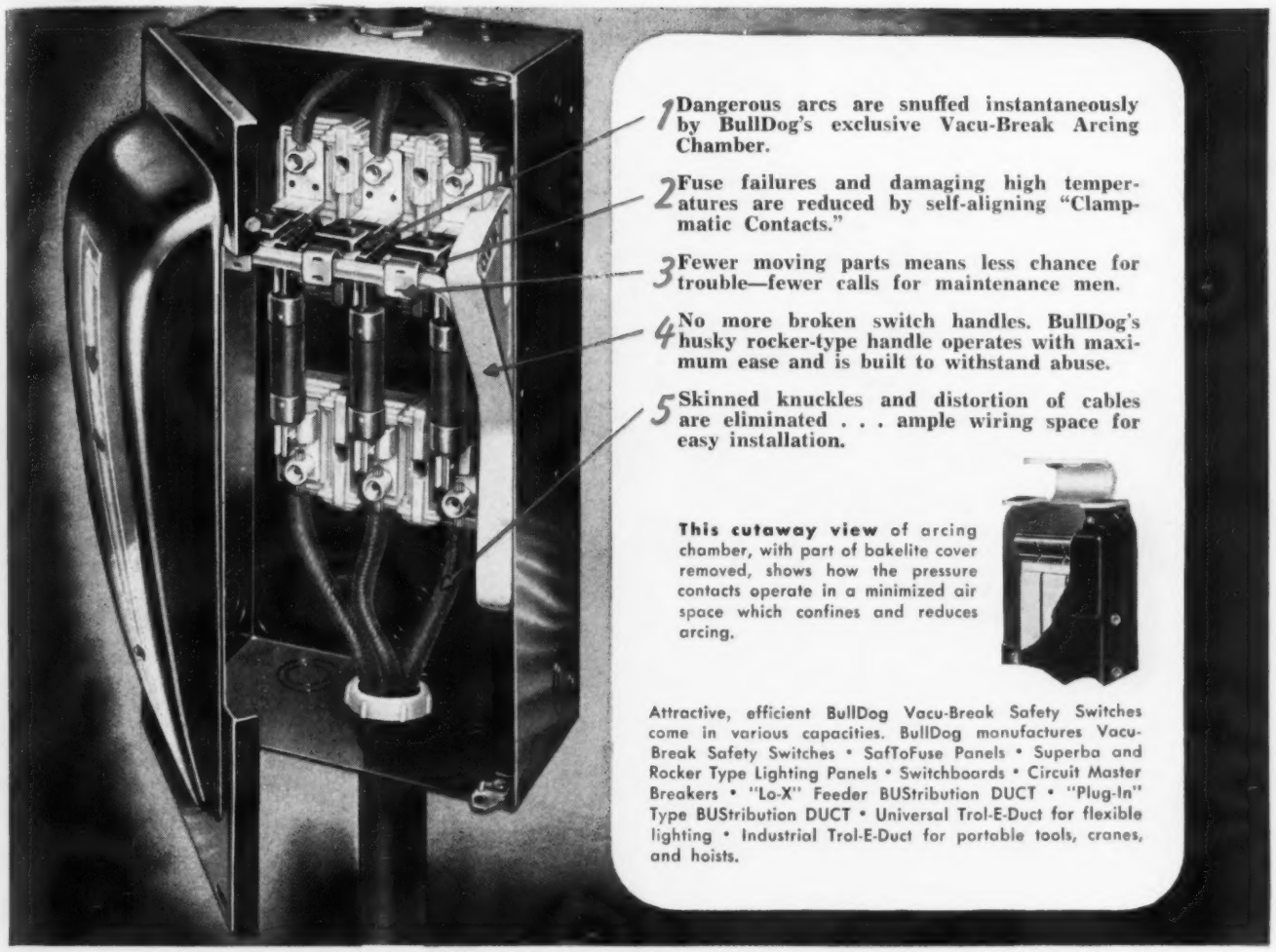
A tighter grip — important at very light sag tensions — results from this lubrication.

To exclude dirt and grit, the splices are individually packed and sealed in sturdy plastic envelopes.

Reliable ELECTRIC COMPANY

3145 CARROLL AVENUE CHICAGO 12

OVER 40 YEARS Service TO THE UTILITIES



1 Dangerous arcs are snuffed instantaneously by BullDog's exclusive Vacu-Break Arcing Chamber.

2 Fuse failures and damaging high temperatures are reduced by self-aligning "Clampmatic Contacts."

3 Fewer moving parts means less chance for trouble—fewer calls for maintenance men.

4 No more broken switch handles. BullDog's husky rocker-type handle operates with maximum ease and is built to withstand abuse.

5 Skinned knuckles and distortion of cables are eliminated . . . ample wiring space for easy installation.

This cutaway view of arcing chamber, with part of bakelite cover removed, shows how the pressure contacts operate in a minimized air space which confines and reduces arcing.

Attractive, efficient BullDog Vacu-Break Safety Switches come in various capacities. BullDog manufactures Vacu-Break Safety Switches • SafToFuse Panels • Superba and Rocker Type Lighting Panels • Switchboards • Circuit Master Breakers • "Lo-X" Feeder BUStribution DUCT • "Plug-In" Type BUStribution DUCT • Universal Trol-E-Duct for flexible lighting • Industrial Trol-E-Duct for portable tools, cranes, and hoists.

No parking for arcing with Vacu-Break switches

THAT'S RIGHT . . . this switch eliminates the threat of dangerous arcs and high temperatures . . . remains just as cool as a cucumber. It has no reason to worry about such things.

Arcs "snuffed out'

In BullDog Vacu-Break Safety Switches, electrical contact is made and broken in a special arc-resistant chamber. Arcs are smothered by lack of oxygen before they have a chance to burn or pit contacts . . . or build up dangerously high temperatures. And BullDog's "Clampmatic Contacts" assure a bolt-tight connection for cool, efficient operation.

Arcing means trouble

Uncontrolled arcing in switches means all-around trouble. It's more than a matter of menacing your operators' safety. Burning and pitting of contacts with accompanying high temperatures result in lowered operating efficiency and eventual breakdown.

With the exclusive Vacu-Break principle, BullDog Safety Switches put an end to these problems. Arcing is held to an absolute minimum, and clean make-and-break of contacts insures long and efficient service.

Troublesome switches are a major problem in electric power distribution. Your first thought should be of your nearby BullDog Field Engineer. He is an expert in this field, and can furnish you with valuable advice and suggestions when you put your power problems in his hands. A consultation with him in the beginning can save you money and trouble later.

BULLDOG ELECTRIC PRODUCTS COMPANY

DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES

IN CANADA: BULLDOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO

BULLDOG

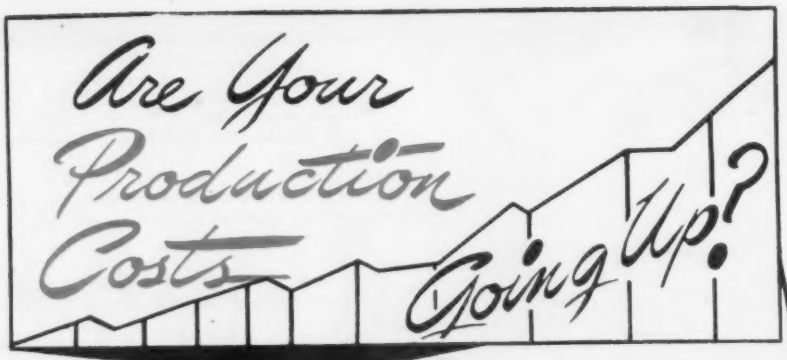
HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N. E. Sixth Avenue Tel. Garfield 2844
Portland 12, Oregon

Safety Switchboard Company
1445 Stevenson St. Tel. Hemlock 1-2470
San Francisco 3, Calif.

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street Tel. Logan 5-5331
Los Angeles 11, Calif.



LET SCHENECTADY INSULATING VARNISHES CUT YOUR UNIT COSTS!

SCHENECTADY has the answers! . . . Through:- **Laboratory Research!** . . . **Production Control!** . . . **Technical Field Service!** . . . and fully developed and tested varnishes and application techniques for all insulating work! Let our Laboratory-Factory Trained Field Representatives show you how we can help you . . . (1) **Increase Production** (with same facilities) through quicker drying varnishes . . . (2) **Insulate More Units Per Gallon** with varnishes that go farther and last longer . . . (3) **Satisfy Your Customers** by giving them greater "Break-Down Strength" (longer life—better service—fewer repairs).

DON'T USE A MISFIT

Why not use the Insulating Varnish that goes with all your other Resin-Base Products? . . . Made by the same manufacturer who produces Wire Enamel, Formvar and the **Correct** Resins for Varnish Cambric, Laminated Parts, etc. Put the responsibility on our Laboratory and our trained Field Representatives!

INVITE SCHENECTADY COMPETITION!

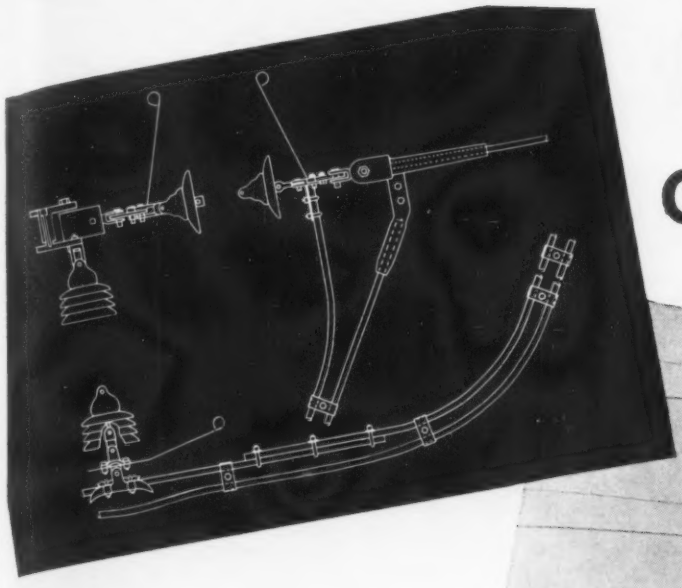
Costs are high! . . . Margins are important! . . . Let us help!

Send for Our New Catalog or for Technical Field Service. Address
SCHENECTADY VARNISH COMPANY, 500 Congress Street, Schenectady, New York

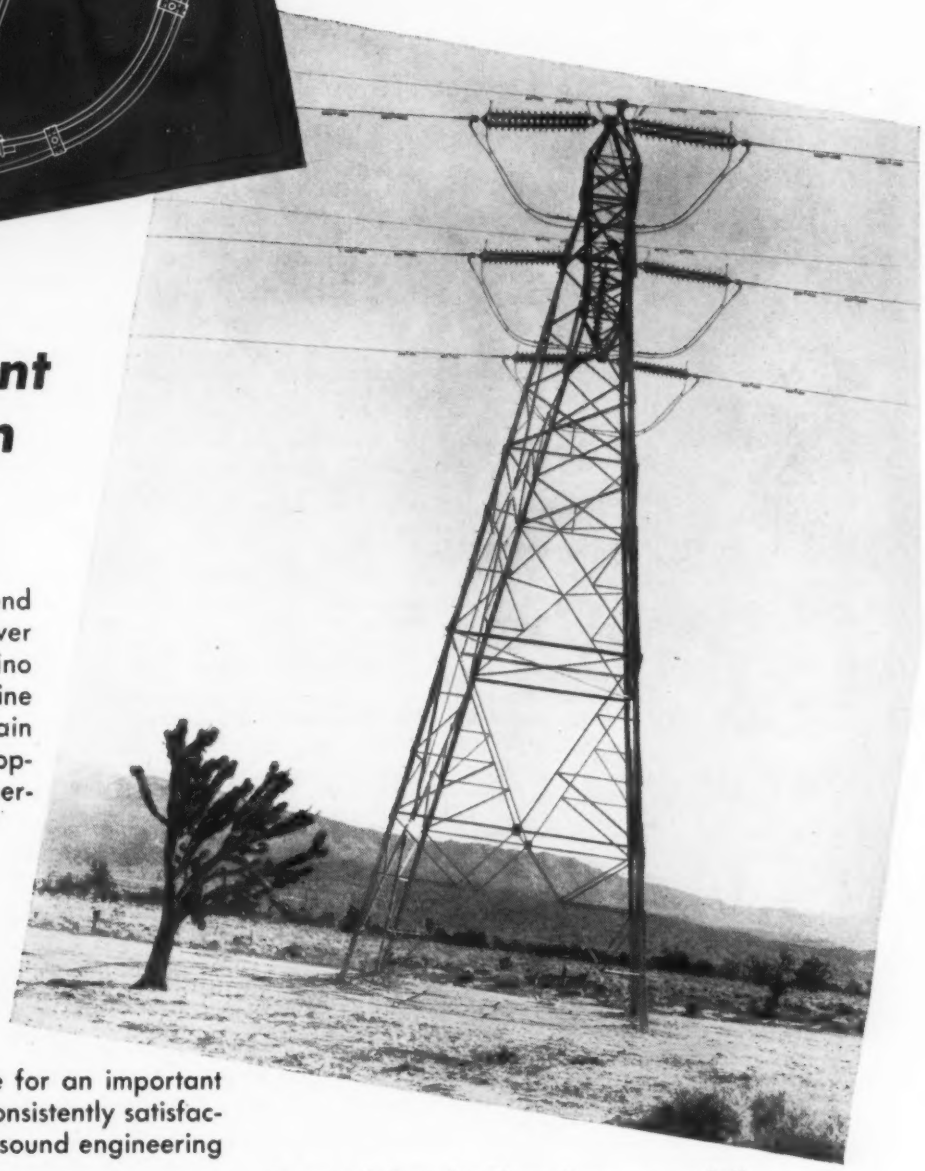
Distributed on the Pacific Coast by
ELECTRICAL SPECIALTY COMPANY
SAN FRANCISCO, 316 Eleventh Street
LOS ANGELES, 418 East Third Street
SEATTLE, 2406 First Avenue
PORTLAND, 325 N. W. 6th Avenue
DENVER, 1015 Twenty-first Street

SCHENECTADY

SCHENECTADY VARNISH COMPANY, Inc.
Schenectady, New York



BTC FORGED STEEL CLAMPS AND FITTINGS



For important transmission lines

View of a dead-end tower on the Hoover Power House to Chino Substation 220 kv. Line showing Double Strain Yokes, Jumper-Loop-Stiffener, and Jumper-Loop-Suspension assemblies.

Sold only through your insulator manufacturer

Selection of hardware for an important transmission line calls for consistently satisfactory service as evidence of sound engineering and good materials.

The Southern California Edison Company built its Hoover Power House to Chino Substation transmission line to bring Hoover Dam power to its large distribution area — with connecting lines to Capistrano, Laguna Belle, Barre, and Lighthipe substations:

For the proper design and economy in maintenance, specify BTC forged steel line hardware for your transmission line.

Essential data for these lines are as follows:
Length—543 miles, 220 kv.; 35 miles, 115 kv.
Conductors—605,000 cm., 660,000 cm., and 397,500 cm.
Constructed—1937, 1939, 1940
Contractor—Stone & Webster Engineering Corp.
Terrain—Rugged for major length.
Hardware—BTC Forged Steel Clamps, Strain Yoke Sets, Arcing Horns and Tower Fittings
Performance—Satisfactory.

THE BREWER-TITCHENER CORPORATION, CORTLAND, N. Y.

Quik Quiz on CONDULETS

Questions and answers
regarding the backbone of an electrical wiring installation

Type C Obround Condulet
Broken-away view showing (1) tapered threads, and (2) the Wedgenut fastener

Question. When were CONDULETS first made?

Answer. In 1906 Crouse-Hinds Company introduced CONDULETS to the electrical wiring industry. CONDULETS represented an entirely new idea in conduit outlets, totally unlike the outlet boxes and fittings previously made. CONDULETS were destined to revolutionize electrical conduit installation practice.

Q. How did the word "CONDULET" originate?

A. Crouse-Hinds new conduit outlets needed a name so the word "CONDULET" was coined, a contraction of "conduit" and "outlet." It is registered in the U. S. Patent Office and designates a product made only by the Crouse-Hinds Company.

Q. What were the advantages of CONDULETS over previous outlets?

A. The older outlets were both unhandy and unsightly, while the new cast CONDULETS were streamlined, compact outlets that were handy to install and produced a neat appearing job. The oblong body with round ends suggested the name "Obround", which was applied to the first series of CONDULETS.

Q. Were they like the present Obround CONDULET?

A. There have been important refinements, but the basic design remains the same. The most notable improvement was the Crouse-Hinds Wedgenut fastener which provides a handy way to firmly attach the covers.

Q. How many types are now in the Obround Series?

A. Forty-nine types. Sizes to fit $\frac{1}{8}$" to 6" conduits, with a wide selection of interchangeable covers and wiring devices.

Q. What other CONDULETS have been added to the line?

A. Obround CONDULETS were so well received by the electrical trade that a variety of other types followed in rapid succession. In fact, the CONDULET line has grown far beyond the original concept and now includes, besides the items needed for the usual conduit installations, a complete line of explosion-proof and dust-tight CONDULETS for use in industries where explosive gases or dust require special electrical safeguards.

Q. Why are all the threads in CONDULET hubs taper tapped?

A. Because all conduit threads are tapered and it makes an imperfect job if a tapered thread is screwed into a straight threaded hole. When using CONDULETS, the threads on the conduit firmly engage every thread in the hub, because both are tapered. This makes a rigid joint which will not loosen under vibration and also assures permanent ground continuity. Taper tapping is an important Crouse-Hinds feature.

Q. What about CONDULET quality?

A. CONDULETS have always been noted for the highest quality. They are scientifically designed in Crouse-Hinds Engineering Department and carefully manufactured in a modern factory by skilled craftsmen from the finest material obtainable. Crouse-Hinds operates four separate laboratories where trained technicians assist in the development of new products and maintain a constant control over the quality of CONDULETS.

Q. How many CONDULETS are there today?

A. More than 15,000 items constitute the present CONDULET line. Conduit installations in all parts of the world are equipped with CONDULETS.

Q. WHERE CAN I BUY CONDULETS?

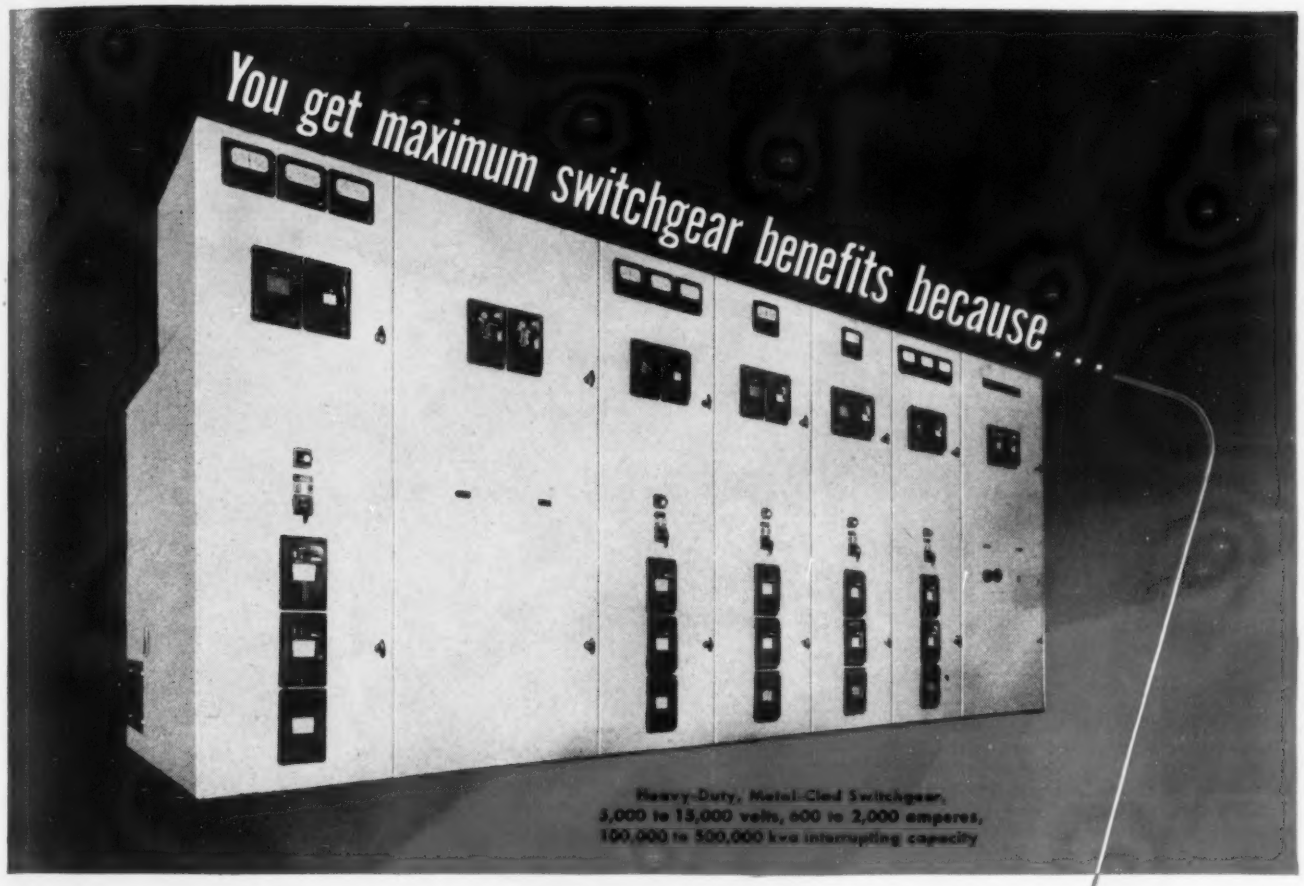
A. From the beginning it has been the Crouse-Hinds policy to have . . . **A Nationwide Distribution through Electrical Wholesalers.** There is one near you.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington.
Resident Representatives: Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va.
CROUSE-HINDS COMPANY OF CANADA, LTD., *Main Office and Plant:* TORONTO, ONT.

A Nationwide Distribution Through Electrical Wholesalers

CONDULETS
FLOODLIGHTS
TRAFFIC SIGNALS
AIRPORT LIGHTING


You get maximum switchgear benefits because . . .
Heavy-Duty, Metal-Clad Switchgear,
5,000 to 15,000 volts, 600 to 2,000 amperes,
100,000 to 500,000 kva interrupting capacity

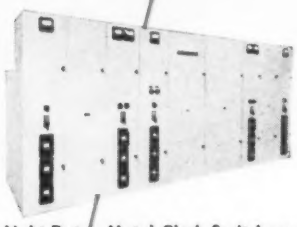
It's a case of getting all 10 in all 3!

When you standardize with Westinghouse Unitized Switchgear you gain ten important benefits—some immediately—others throughout the course of its operation. And you gain these advantages, regardless of the nature of your requirements, because standardization has been applied to all three types of Westinghouse Switchgear—Heavy-Duty, Metal-Clad . . . Light-Duty, Metal-Clad . . . Low-Voltage, Metal-Enclosed.

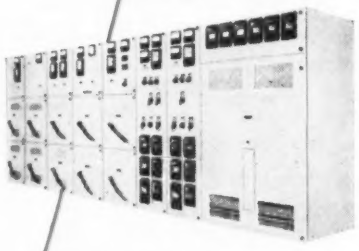
Standardization benefits you because it permits constant use of proved manufacturing methods that produce high product quality while effecting big cuts in manufacturing time and costs. The results are superior performance . . . quicker delivery . . . lower installed price.

Specifically, standardization provides all the benefits listed below. Just how it does this is explained in booklets currently available. Write—indicating your requirements—to your nearest Westinghouse office or to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60667

- Lower planning and ordering costs
- Lower manufactured cost
- Lower installation cost
- Lower operation and maintenance costs
- Greater service continuity
- Greater safety
- Greater versatility
- Longer life
- Shorter manufacturing time
- Superior equipment for outdoor requirements



Light-Duty, Metal-Clad Switchgear, 5,000 volts, 600 to 1,200 amperes, 50,000 kva interrupting capacity.



Low-Voltage, Metal-Enclosed Switchgear, 600 volts maximum, 15 to 6,000 amperes, 15,000 to 100,000 amp. interrupting capacity.

IT'S STANDARDIZED!

Westinghouse UNITIZED SWITCHGEAR

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

INDOOR AND OUTDOOR SERVICE

When you buy a Simplex Paper Insulated Cable:—

—Experienced cable engineers will make careful field studies of your operating conditions and special problems and will design a special Simplex Paper Cable to give you efficient service. If you prefer, the cable will be manufactured to your specifications.

—The insulating paper and the oil have been selected after much research to find materials that are completely compatible and will give you the operating characteristics you want in your cable.

—The equipment used to manufacture your cable will be completely up-to-date. The tensions, overlays, vacuums, impregnating machinery are all automatically controlled and all are carefully chosen to produce optimum results in the finished cable.

—The work will be done by experienced workmen under expert supervision.

—Tests will be made during manufacture and before shipment to be sure the cable meets your specifications and our rigid requirements.

—The cable you will get will be your cable — custom-made for you.

Bulletin #109 — Simplex Paper Insulated Cable — will be sent upon request.

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

FOR PROTECTION

Specify Rigid Steel Conduit

FOR PROTECTION PLUS

Specify G-E Rigid Conduit

To protect wiring from mechanical abuse, it's steel that does the job best. For extra protection from chemical and atmospheric conditions, specify General Electric rigid steel conduit, manufactured and treated specifically to give wiring long service life.

General Electric conduit is carefully manufactured from high-quality steel. Two types are available—each specially coated for specific kinds of corrosion.

G-E WHITE CONDUIT has a hot-dipped zinc coating that gives lasting protection from heat, cold, sunlight, condensation, rain and sleet—from all types of atmospheric corrosion.

G-E BLACK CONDUIT has a baked-enamel coating that gives protection from acids, liquids, fumes, and oil—from all types of chemical corrosion encountered in plants and factories.

Specify white or specify black, but make sure that it's General Electric rigid steel conduit, and get the best possible protection for wiring. For further information, see your nearest General Electric Construction Materials distributor, or write to Section C11-1125, Construction Materials Department, General Electric Company, Bridgeport 2, Conn.

GENERAL ELECTRIC

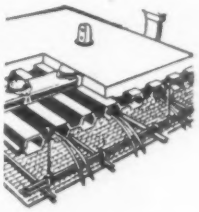
RACEWAYS ROUNDUP

with your

GENERAL ELECTRIC

Construction Materials Distributor

AVOID BUYING HEADACHES by turning over your order to a General Electric distributor. He can supply every item you need, from largest size conduit down to the smallest fitting. One order does it—no need to run around getting conduit in one place and fittings in another. Your General Electric Construction Materials distributor has access to every item in the complete General Electric wiring materials line.



ELECTRICAL RACEWAYS that are always quickly and conveniently available—that's what Robertson Q-Floors and General Electric Q-Floor Wiring provide. Circuits can be removed, or new outlets can be installed, on the floor surface where they are needed, when they are needed, in a few minutes. For more details about Q-Floor Wiring, ask to have a General Electric underfloor specialist call on you.

LOOK AROUND. Are you getting in on the broad, new markets for General Electric flexible conduit? This high-quality raceway has greater acceptance among engineers, contractors, electricians, and inspectors than ever before. For communication and signal systems, residences and apartment houses, machine tools, electric ranges, and temporary wiring, "flex" goes in fast, and gives dependable protection. It's available now! Take advantage of this fast, easy-to-install raceway. Specify it, wherever you can, for more business.

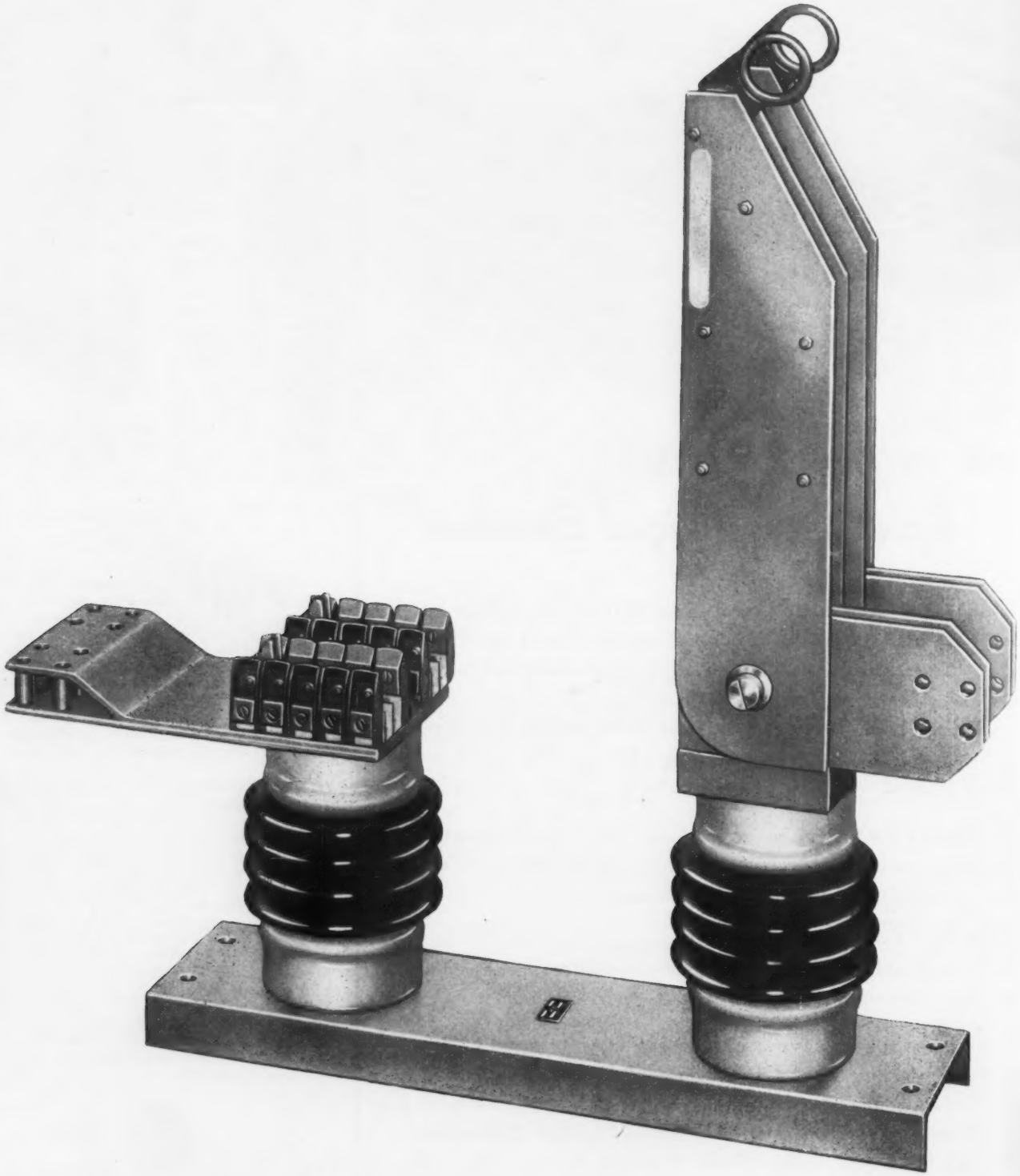
INSTALLED IN LESS THAN A MINUTE. New sectional switch boxes with convenient nail holes speed installation. No need to unscrew the side section in order to fasten the box to the stud . . . simply drive ordinary 10d nails through the nail holes at the top and bottom of the box. That's all there is to it. In a matter of seconds, the box is ready for wiring. Nails do not interfere with knockouts, and there is adequate clearance for all standard devices.

G-E Conduit Products

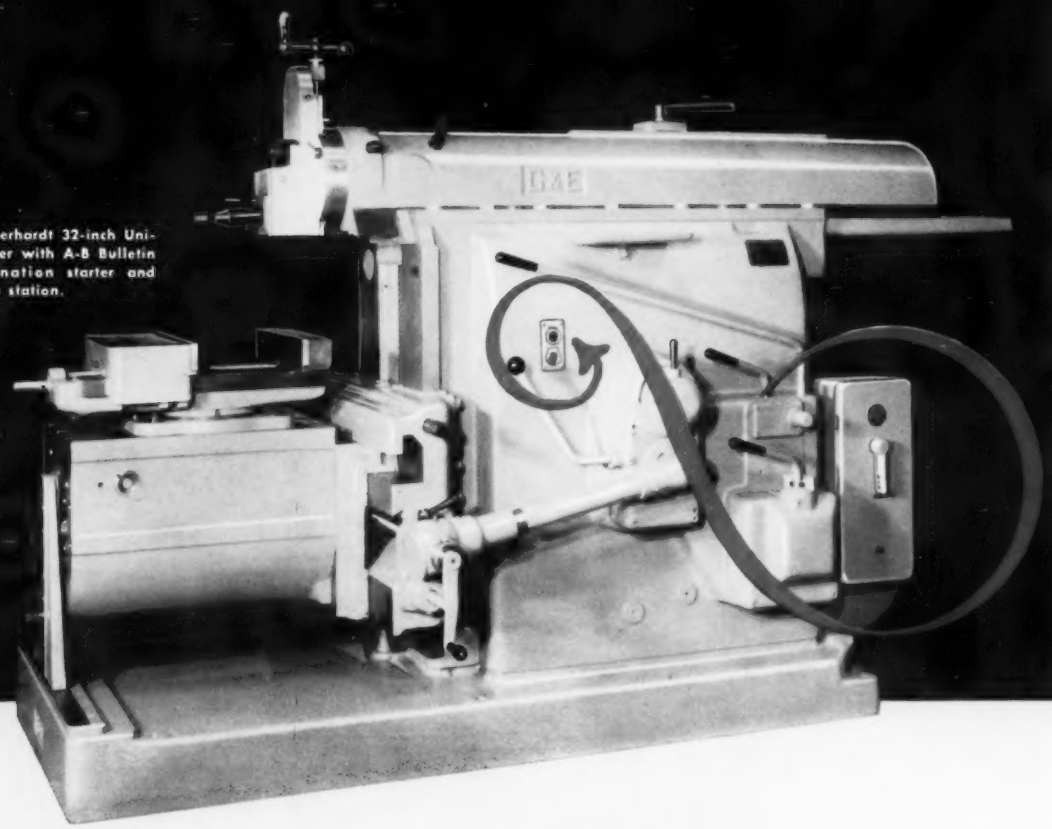
Cole Electric Co.

8439 Steller Drive Culver City, Calif.

TExas 0-4701



OUTDOOR HOOK STICK DISCONNECTING SWITCH
15,000 Volts—4,000 Amperes
Type Y-2—Single Pole, Single Throw
For Vertical or Underhung Mounting
(See Bulletin 20-A)



Gould & Eberhardt 32-inch Universal Shaper with A-B Bulletin 712 combination starter and push-button station.

Make a Neat Installation Save Space — Save Time

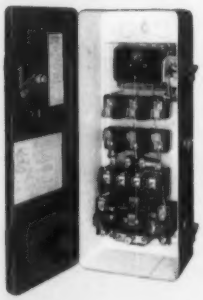
with A-B Bulletin 712 Combination Starters

Do away with old-style disconnect switches and starters hanging all over your machines! Simplify your wiring jobs . . . make neater installations . . . use A-B combination starters that have both units—disconnect switch and motor starter—in a single enclosing cabinet.

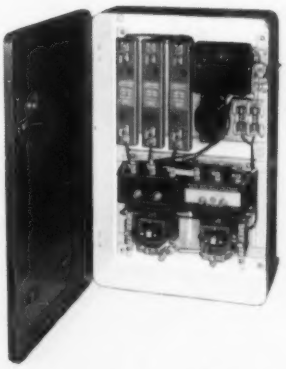
There is greater safety, too. The interlocked disconnect lever must be in OFF position to open the cabinet. The motor starter is then "dead." And there is less conduit . . . less wiring . . . less clutter to mess up the installation.

Bulletin 712-713 describes A-B combination starters—fused, nonfused, and with circuit breakers. Bulletin 706-7 describes the corresponding line of combination reversing switches.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.



Bulletin 712 combination starter with disconnect switch and magnetic starter in one cabinet.



Bulletin 706 combination reversing switch with fuse blocks and low voltage control circuit transformer.

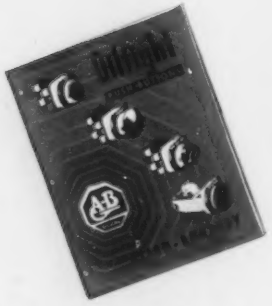
A-B Quality

ALLEN-BRADLEY

COMBINATION STARTERS

QUALITY

Your Tough Control Problems are so easily solved with this complete line of A-B Control Units



Bulletin 800T describes the new line of Allen-Bradley Oiltight Push Buttons for machine tools. Every shop should have a copy of this bulletin.

Every motor control problem calls for a particular type of control unit . . . sometimes many types and sizes of units are necessary. But it's so easy to make up the special combinations you may need with standard Allen-Bradley starters, contactors, relays, limit switches, push-button stations, etc. There they are . . . hundreds of standard types and sizes . . . all tested and ready to work for you . . . and conveniently listed in the Allen-Bradley condensed catalog. We shall be glad to mail you a copy. It is a handy control manual for plant designers, maintenance men, and purchasing agents.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

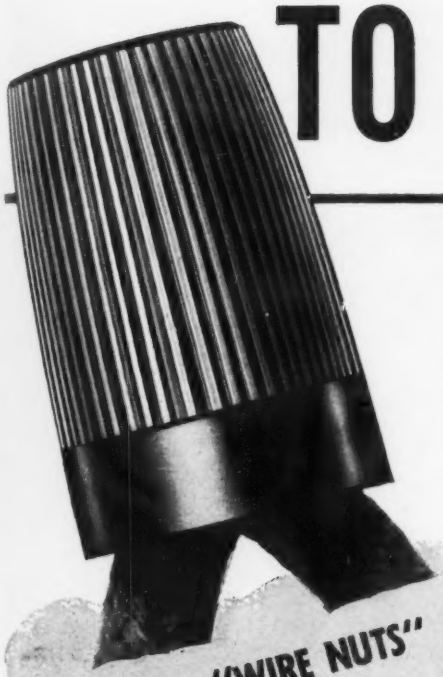
Bulletin 600 starting switch for motors up to 1 horsepower.

A-B Quality

ALLEN-BRADLEY

TROUBLE-FREE MOTOR CONTROLS

IT COSTS YOU LESS TO USE THE BEST

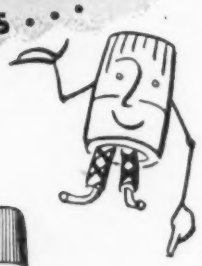


IDEAL Wire-Nuts*

Patented, No 1,933,555

THE SOLDERLESS, TAPELESS WIRE CONNECTORS

Only "WIRE NUTS" give you all these advantages . . .



Easier to Use
Just screw on—that's all! No solder, tape or tools.

Resist Pull-Out
A "Wire-Nut" joint of two No. 14 wires will stand up to 176 pounds pull.

Dependable
Not affected by vibration. Non-corrosive — resists abrasion.

Safe
Wire ends fully insulated by strong, moisture-resistant Bakelite shell that prevents "grounds" and "shorts".

Top Quality
Built to precision standards. Inspected and tested with laboratory care.

Approved
IDEAL "Wire-Nuts" are listed by Underwriters' Laboratories, Inc., and approved by other leading electrical authorities.

The cost of the "Wire-Nuts" used in any wiring job is a very small part of the total job cost—actually only a few cents per connection. Yet, it's what you get for those few cents that makes "Wire-Nuts" the most economical wire connectors you can buy, on the basis of overall costs . . . that *may* make the difference between a good job and one that's a headache for both contractor and owner.

That's because the extra quality you get in "Wire-Nuts" never varies. *In 1,000 "Wire-Nuts" you can count on 1,000 perfect wire joints.* No "duds", no rejects, no connections that must be remade at added cost and time!

From raw materials to finished product, "Wire-Nuts" must undergo the most rigid control at every production step. . . . Molding compound used in the protective plastic shell must be *exactly* right. Wire for the spring insert is tested for strength and uniformity of size, then copper coated for extra protection and corrosion resistance. Inserts themselves are sample-tested on a 40-to-1 comparator to .001" tolerance. . . . In all, the finished "Wire-Nut" must pass nine different inspections and tests.

Costly for IDEAL to be so particular? Of course it is—but it's the reason why "Wire-Nuts" cut your costs on the job, And—*added to the fact that "Wire-Nuts" are the easiest and fastest way to make approved wire joints*—it's the reason why contractors prefer "Wire-Nuts" 7-to-1 over any other mechanical connector, as shown by recent survey.

It is also the reason why, if you aren't using "Wire-Nuts", you should be! Get a supply today from your IDEAL Distributor . . . IDEAL INDUSTRIES, Inc., Sycamore, Illinois.

*Trade Mark Reg. U. S. Pat. Off.

IDEAL *Distributed Through* AMERICA'S LEADING WHOLESALERS

"To meet rapidly increasing demands, we are installing . . .

Capacitors

as fast as available labor permits."

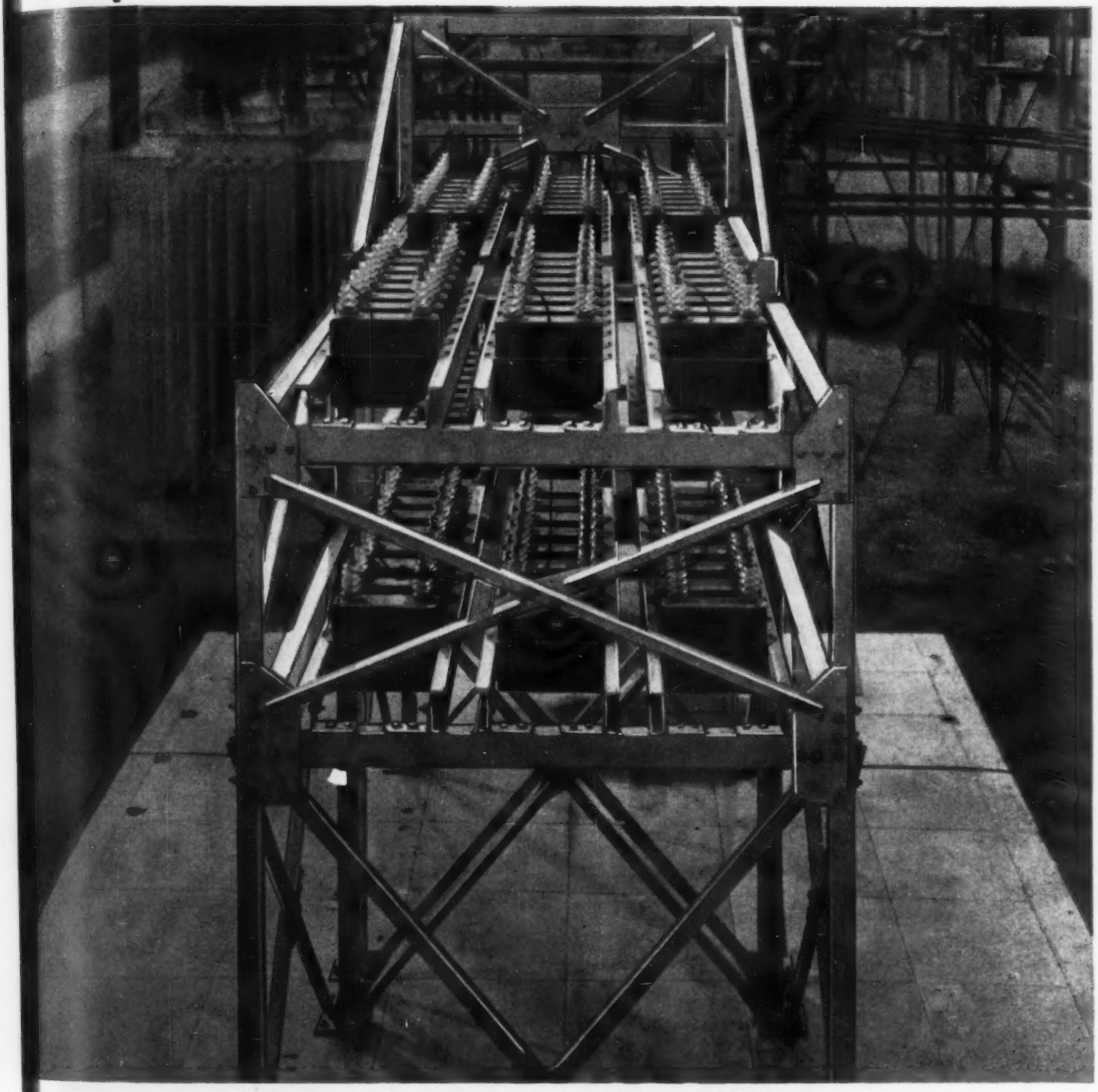
THE SOUTHERN CALIFORNIA EDISON CO.

This is the story that the Southern California Edison Co. tells about capacitors.

"More people and more industries in Southern California—and the resulting increased load on the Edison System—have required that system capacity be built up in the fastest and most economical manner possible during the last three years.

"System studies disclosed the economy of capacitor installations. With our goal set at 20% of our peak-load kva in static capacitors, we began our program in 1945.

"Our Distribution Division installed as many of the capacitors on distribution feeders as available labor would permit. To accelerate the program, capacitors were also installed on 4-kv substation buses in banks ranging, in general, up to 20% of station peak load—the largest bank including 330 units or 4950 kva. These capacitors are directly connected to lines or buses. Switched capacitors are



Bank of capacitor units connected to 4-kv substation bus of Southern California Edison Company.

being installed where local conditions justify the use of automatic control.

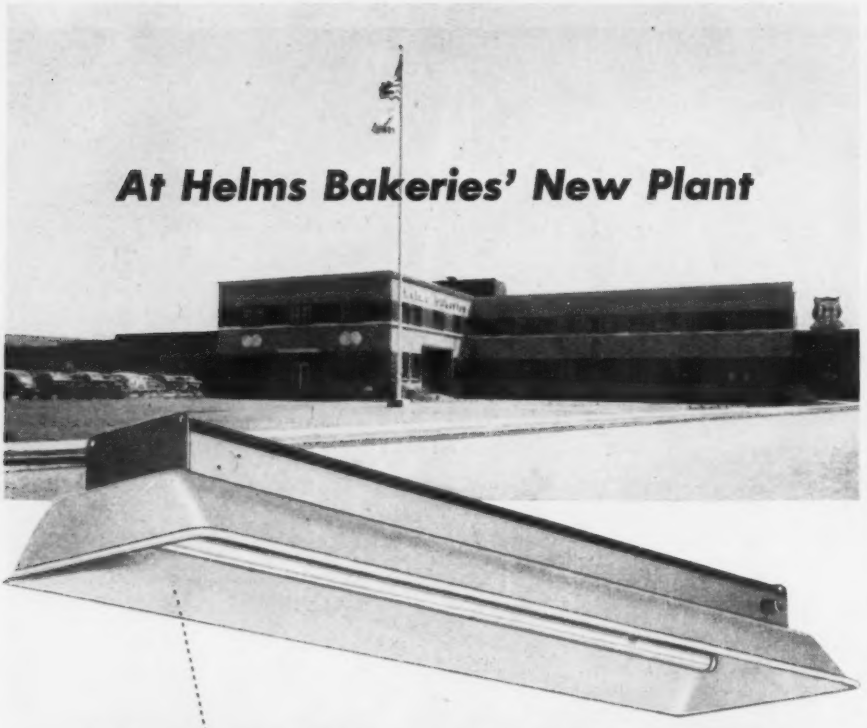
"All low power factor loads are being studied for the application of capacitors, to permit increased loading of existing transformer banks, and to keep distribution line and equipment losses at a minimum.

"Installations made so far have proved the soundness of our decision. We have increased system capacity and improved system efficiency."

The purpose of these advertisements is to encourage electrical utilities to exchange information on the use of power-factor-improvement capacitors. We believe that such an exchange will best bring out that capacitors can be used much more widely than at present—that they provide the fastest way of increasing peak-load capacity—that they can bring many utilities extraordinary returns by increasing capacity of existing distribution lines, transmission lines, transformers and circuit breakers—and that they offer one of the best possibilities of scaling down system costs per kilowatt. If your experience with capacitors would be of interest and value to other companies, we would like to hear from you. Contact your G-E Representative or write *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

407-8



At Helms Bakeries' New Plant

BETTER LIGHTING

CONTRIBUTES TO A BETTER PRODUCT

Seventeen years of experience qualifies Helms Bakeries to say what makes good bread . . . and efficient bakeries. Day and night shifts over a period of nearly two decades have proven to this outstanding company, the importance of more efficiently, more comfortably lighted interiors to a better product.

The installation of Certified Smoot-Holman industrial fluorescent lighting equipment in Helms' new plant in Montebello, California, is Helms' answer to this need. Smoot-Holman industrial lighting fixtures are a positive guarantee of maximum performance with minimum maintenance cost.

SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.

Offices in Principal Western Cities—Branch and Warehouse in San Francisco

PRODUCT NEWS

Building Wire (1100)

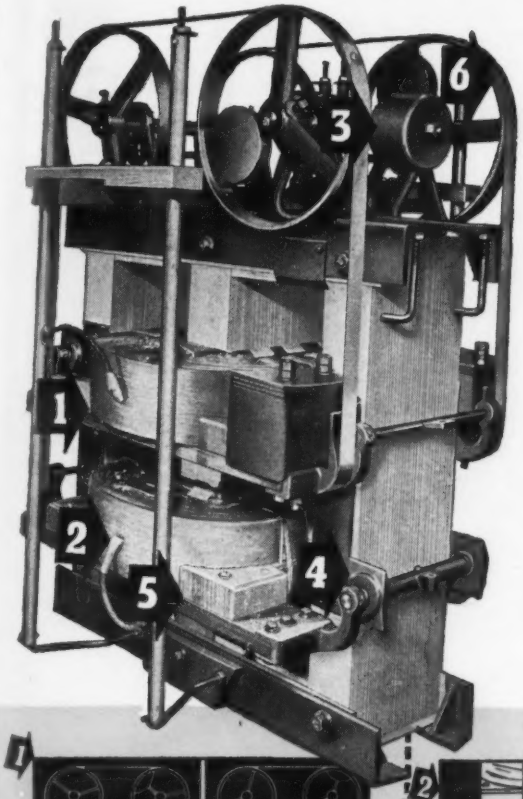
Triangle Conduit and Cable Co. has announced an improved type of rubber-covered braided building wire—R, RH and RW. Known as Glazon, the wire is covered with a sheath woven of inert, inorganic fibers of high dielectric strength, finer than hair. These fibers are said to be flexible, much stronger than cotton or rayon, unaffected by moisture or temperature changes, immune to ordinary acids and alkalis, repellent to fungi and rodents. They cannot burn or rot. The wire is smaller in diameter and lighter in weight than conventional building wires. It is being manufactured in No. 14 and No. 12 B & S, Underwriters' approved. Larger sizes will be announced later.

Barrier Tape (1101)

A low-cost barrier tape for multiconductor electric cable construction has been announced by the Facile Corp. The tape, which holds the cable assembly together while the outer sheath is being applied, consists of a thin acetate film reinforced with unidirectionally applied high-strength Fiberglas yarns spaced 10 ends per inch. It has a finished thickness of approximately 0.0035 in. and a breaking strength in excess of 50 lb. per inch of width. This tape is said to be nonstaining to individual conductors in the assembly and to have very high vapor resistance; to be suitable for use in curing temperatures up to 295°F. It is available in standard cable tape packages slit to widths of ¾, 1 and 1¼ in. and upward in ¼-in. increments. Variations as to number of ends, backing, strength and thickness can be developed.

Expanding Anchor (1102)

The new 8-way steel expanding anchor designed by A. B. Chance Co. is claimed to eliminate the non-holding areas between blades. Controlled by a blade stop, the 8-blade, one-piece top plate expands to form a conically shaped square that distributes the anchor's holding power over a wide area. Each of the blades is required to carry approximately one-eighth of the total load; metal-to-metal sound of the expanding top plate striking the blade stop indicates when the anchor is fully expanded. A nut retainer on the bottom of the base plate allows salvage of rods and makes it easy to push the anchor into the hole.

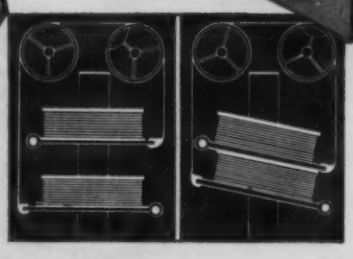


MOLONEY
Constant Current
TRANSFORMERS

For closer regulation . . . faster coil action . . . longer lamp life. Moloney Constant Current Transformers with double-moving coil action, sturdy construction, and ball-bearing equipped moving parts require practically no adjustment or attention after proper installation. Available in Pole and Subway Types, with or without capacitors, and in air-cooled Automatic Station Types.

CHECK THESE SUPERIOR FEATURES ✓ ✓

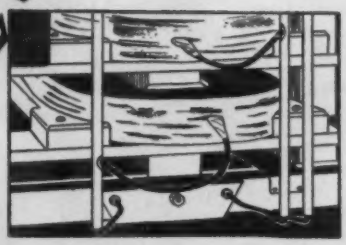
1



Double Moving Coils

Each coil moves one-half the distance of the single moving coil in ordinary regulators. Normal secondary current is attained quicker upon load changes or primary surges, with coils parallel throughout operation. Lower kinetic energy practically eliminates force on bumpers during short circuit.

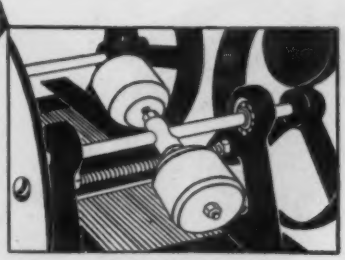
2



Extra-Flexible Leads

Extra-flexible cable is used for leads to prevent sluggish movement of the coils and to avoid service interruptions due to lead breakage. To protect and support them, leads are brought up to the terminals through heavy insulating tubes which are firmly anchored at both ends.

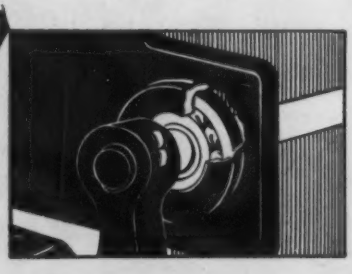
3



Adjusting Weight

The adjusting weight is mounted at the top on the shaft of one of the pulley wheels. It is arranged with a vernier for accurate and accessible adjustment. After adjustment is made, the weight is securely locked in position at the factory to deliver constant rated current. No adjustment is necessary when installing.

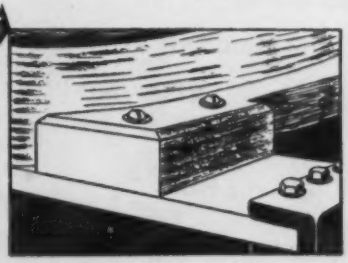
4



Ball Bearings

All moving parts are fitted with precision ball bearings to eliminate friction. The coils are hinged on ball bearings, the primary at one end and the secondary at the other. Hinge points are rigidly fixed by metal plates bolted to the core.

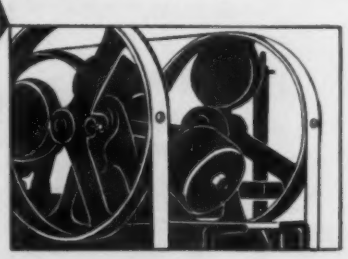
5



Coil Mounting

The supports on which the coils are mounted are designed to withstand impact between the coils themselves and impact between the coil supports and the bumpers, under the most severe operating conditions. Coils are rigidly blocked on the supports to maintain accurate alignment.

6



Stainless Steel Bands

Corrosion-proof stainless steel bands are securely fastened to the moving ends of each coil and to the pulley wheels to hold the coils parallel for the complete range of operation. These stainless steel bands last indefinitely.

MOLONEY ELECTRIC CO. ☆ ST. LOUIS 20, MO.

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Send for bulletin SL-701 describing Moloney Constant Current Transformers

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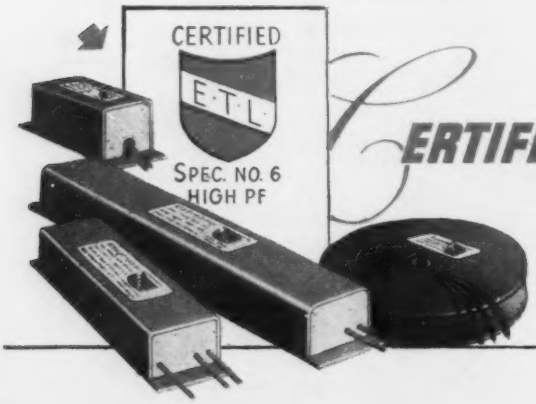
Everyone benefits by using Certified Ballasts because they assure . . .

Full lamp life **Rated light output**
Quiet operation **Dependable performance for fixture life**

Strict specifications control the building of every Certified Ballast—Electrical Testing Laboratories, Inc., an impartial judge, then checks and tests them. You're surer of satisfaction with Certified Ballasts.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

WE STOPPED THEIR BREATHING TO PROLONG THEIR LIFE!

On large tanks, Nitrile rubber gasket of circular cross-section is compressed as shown. Ring welded to tank keeps gasket in place—prevents too much compression.
On small tanks, Nitrile rubber gasket of square cross-section is compressed between rim of cover and deep-rolled flange on tank. Shown uncompressed.

In G-E Spirakore® transformers, Nitrile rubber gaskets—unharmed by oil, age, or operating temperatures—effectively seal out atmospheric air, moisture, and other contamination—thereby greatly prolonging the life of the insulating oil and consequently the units themselves. By redesigning the tanks, covers, handholes, and gaskets, we've made this sealing possible *and improved accessibility!*

Some years back,we sealed our power transformers completely. Now we've done it with all liquid-immersed, distribution transformers. We've stopped their breathing, too. We've made sealed tank construction available in all General Electric Spirakore transformers—from the smallest to the largest.

Other Improvements

Yet sealed-tank construction is only one of the improvements you get with General Electric distribution transformers. You get Spirakore design—for great savings in size and weight. You get improved impulse strength. You even get a new and better baked synthetic-resin paint, which reduces maintenance costs.

Today—as ten years ago when lighter, smaller Spirakore transformers first made history—Spirakore still leads the field. It's the finest distribution transformer we have ever made, the finest you can buy. Ask for Bulletins GEA-4885 and GEA-4521. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

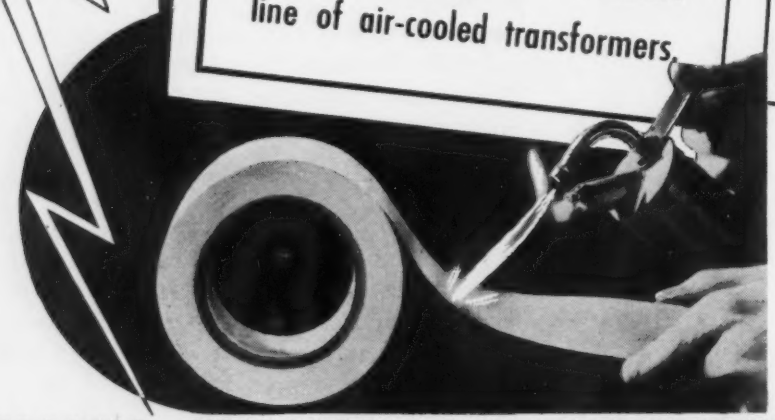
Spirakore Transformers

GENERAL ELECTRIC

402-156

NEW! A Good Transformer MADE BETTER!

MTC uses the new JOHNS-MANVILLE *Quinterra* insulation throughout its entire line of air-cooled transformers.



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AIR-COOLED TRANSFORMERS
1 to 1,000 KVA up to 15,000 Volts to meet Individual Requirements

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- GENERAL PURPOSE
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Insulation determines the working life of an air-cooled transformer. Marcus Transformers have always been known for their use of superior Class B and C heat-proof insulation. In this phase of construction, MTC has pioneered many noteworthy firsts. AGAIN, MTC is pioneering in the use of *quinterra* throughout its entire line of air-cooled transformers. That's why when air-cooled transformers are specified or needed, the reputation of Marcus stands pre-eminent in its field. That's why we invite your inquiry with confidence, knowing that once you have utilized a Marcus air-cooled Transformer, you will specify no other.

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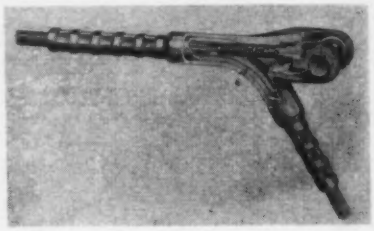
San Francisco, California
ROBERT A. YOUNG & COMPANY
Los Angeles 15, California

Dead-End (1103)

A compression dead-end that may be installed on a tower at the point of attachment to the insulator string has been announced by Thomas & Betts. The installation is made with a light, portable hydraulic tool, transported by means of specially designed pack bundles carried on a man's back. Adjustable straps are available for comfortable portage of equipment. Manufacturer states



that this new dead-end furnishes a continuous, uninterrupted, high conductivity path for the current, since one aluminum tube holds both main cable and jumper loop. It features compressions both in the main cable and jumper loop. Conductance is higher than that of the same length of cable. Only aluminum and non-magnetic stainless steel are used in these fittings, eliminating eddy currents, hysteresis losses, magnetic heating. All surfaces and edges of the installed fitting are smooth and well-rounded to minimize corona losses. There are no bolted connections to loosen.

Ground Rod (1104)

Jasper Blackburn Products Corp. has developed a copper-clad ground rod. It is completely covered (including the point and driving ends) with a heavy coating of pure copper, molecularly bonded to the steel core. The core has a higher carbon content than is ordinarily used, according to the manufacturer. The rod meets Underwriters' specifications; is made in ½ and ⅝ in. in the 8- and 10-ft. lengths and ¾ in. in the 10-ft. length.

Take-Off Kit (1105)

Wiremold is offering No. 200-19 take-off kit for extending from an existing wall outlet to a run of 1900 Plugmold, wired or unwired, on top of baseboard. It consists of a No. 251 extension adapter, a 15-in. length of No. 200 Wiremold, a No. 1989A reducing connector and a wiring harness of No. 12 Type R conductors.

Straightline Splices (1106)

Reliable Electric Co. has announced that its straightline splices are now filled with a neutral grease to prevent corrosive action in the splice and to act as a lubricant, decreasing friction between the backs of the jaws and the tube of the splice. Each splice is packaged individually in a double cellophane pouch.

Scaffold (1107)

A scaffold for electrical installations and maintenance is offered by Up-Right Scaffolds. It is made of heat-treated aluminum alloy. A 7-ft. single section unit can be erected by one man in a minute; a 45-ft. multiple unit in 15 minutes, the manufacturer states.

A new revolutionary electrical **Plug-in Strip**

For Commercial and Residential Uses

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AT LAST—

A PROFESSIONAL Multi-Outlet Wiring Assembly that is:

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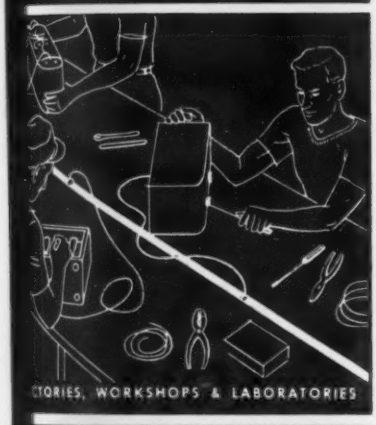
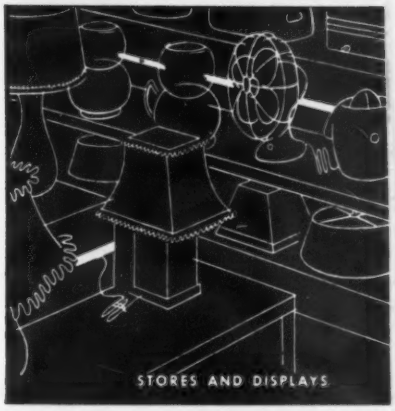
EASY TO INSTALL
SAFE AND STRONG
PROFITABLE AT NOMINAL INSTALLED COST



TORIES, WORKSHOPS & LABORATORIES



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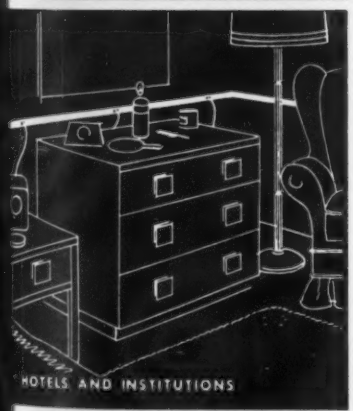
4 Outstanding Features . . .

1. *Solid copper electrical system* from panel box to last outlet . . . Not a screw or a soldered connection in it!
2. *Life-time, fool-proof receptacles* . . . Plug prongs receive full length contact and wipe.
3. *Easy to cut on the job* . . . Short lengths are cut to fit in a manner similar to conduit.
4. *Tamper-proof* . . . Capping is permanently locked on. There's no reason to ever open up Plug-In Strip.



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Listed by Underwriters' Laboratories.

MAIL the coupon today for complete information on this revolutionary *professional* wiring assembly.

NATIONAL ELECTRIC PRODUCTS — NE — WIRING SYSTEMS

National Electric Products Corporation
1310 Chamber of Commerce Building
Pittsburgh 19, Pa.

☐ Please send me your catalog on the NEW PLUG-IN STRIP.

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A SERVICE LIFE OF 35 to 40 YEARS FOR UNDERGROUND CABLE AND SPLICES

A new lighting system installed in a western city has an underground cable that is a single solid conductor insulated with polyethylene and jacketed with polyvinyl chloride. Splices are wrapped and built up to 1½ times the cable insulation with No. 33 "SCOTCH" Electrical Tape with Vinyl Plastic backing. In a series of tests one such splice stood 70,000 volts for 45 seconds. Engineers on the job predicted a service life of 35 to 40 years for cable and splices.

If you have an insulation problem that is bothering you why not write today for a "SCOTCH" Tape field Engineer? His experience and advice may save the day for you.

No. 33 SCOTCH Electrical TAPE

ANOTHER 3M COMPANY PRODUCT

Made in U.S.A. by MINNESOTA MINING & MFG. CO. St. Paul 6, Minn.

Immersion Heaters (1108)

A new series of Chromalox electric immersion heaters with standard pipe-threaded screw plug for mounting through tank walls has been announced by Edwin L. Wiegand. The heaters are available with single- or 3-heat switch built into the terminal end or without switch for thermostatically controlled applications.

Single-heat immersion heaters have one tubular element; three-heat heaters, two tubular elements that can be connected in parallel or series, giving full, ½ or ¼ wattage; 460-volt operation is possible by connecting the two elements of a 230-volt heater in series.

Sixteen standard copper-sheathed heaters are available ranging from 600 watts to 10 kw. Eight standard steel-sheathed heaters range from 1 to 6 kw. The majority operate on 115 or 230 volts, four of the larger capacity heaters operating on 230 volts only. Screw plugs are 1¼ in. for single-element heaters and 2 in. for two-element heaters.

Combination Controller (1109)

Square D has developed the Class 8992 type BBG-1 combination controller for a small foot- or motor-operated resistance welding machine. The single enclosure contains a NEMA 1A pneumatic weld timer, a size 1W, 100-amp. high-speed magnetic welder contactor and a control transformer. For operator safety the initiating switch and control circuits operate at 110 volts, isolated from the power supply. The timer is mounted on a Safront swingout panel with adjusting dial on the front and all energized parts in the rear. Controllers are designed to permit either common or separate control supply connections. A dual primary control transformer may be connected for 110, 220, 440 volts 60 cycles or 380 volts 50 cycles.

Enclosed Motors (1110)

Westinghouse has announced that silicone resins for winding insulation and silicone grease for bearing lubrication make possible a totally enclosed non-ventilated motor in a 5-hp., 4-pole rating in the same frame sizes as the open motor of the same rating. This permits reductions of as much as three frame sizes from present standard Class A insulated totally enclosed motors. Efficiency, power factor and torque of such a motor are comparable to those for an open motor of the same rating, the announcement states.

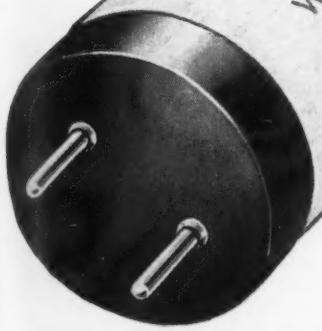
Adjustable Climber (1111)

Miller Equipment Co. is offering a new adjustable climber claimed to have the following features: U-channel shank design, giving greater strength with less weight; removable gaff of improved design; greater foot surface for wide shoes and winter rubbers and better arch support; improved eye for attaching climber straps; screw-fastened adjustable shank allowing size ranges from 14½ to 17½ in.

Ground Rod Driver (1112)

Utility Safety Supply Co. has a new ground rod driver and adapter. The sledge has a hollow handle of double-strength steel pipe. The sledge part is made of 2½-in. cold rolled round steel cut 5 in. long. The adapter is made of 1x12-in. solid cold rolled steel rod, with a hole drilled in one end 3 in. deep. It is set on top of the rod and driven down to the ground. Weight 12 lb.

CHECK THESE ADVANTAGES OF THE NEW Westinghouse 25-WATT FLUORESCENT LAMP



New Lamp Operates Directly From Lighting Circuit; Uses Simple, Inexpensive Choke as Ballast

- **Provides 50% more light output than the 20-watt lamp,** yet uses only 25% more wattage. Has output of 1400 lumens.
- **Uses Krypton starting gas**
- **Permits the use of simple, lightweight, economical fixtures,** of the type used in large quantities for the 20-watt lamp.
- **Provides more lumen output per dollar** of fixture cost. The cost of the ballast for the 25-watt lamp is only slightly more than that for the 20-watt lamp.
- **Will be available in all colors.**
- **Has wide range of applications** — for home, office, store, or factory. The low first cost of fixtures will make this lamp a popular one for innumerable uses.

For more information about the lamp or its operation on either A-C or D-C, write Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey.

Westinghouse Lamp District Offices

10 High St., BOSTON; 2260 Peachtree Industrial Blvd., CHAMBLEE, GA.; 20 N. Wacker Drive, CHICAGO; 40 Wall St., NEW YORK; 3001 Walnut St., PHILADELPHIA; 419 Wood St., PITTSBURGH; 410 Bush St., SAN FRANCISCO; 411 North 7th St., ST. LOUIS.

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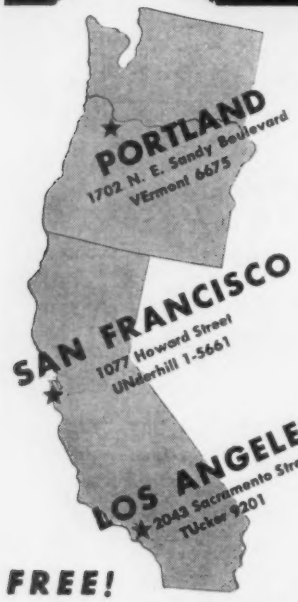
Westinghouse

the name you know in *Lamps*

IMMEDIATE SERVICE
ON ALL
YOUR MOTOR REPAIR MATERIALS AND TOOLS

INSULATION AND WIRES
INCORPORATED



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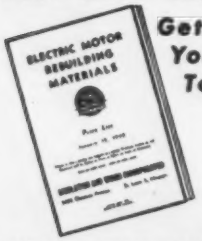

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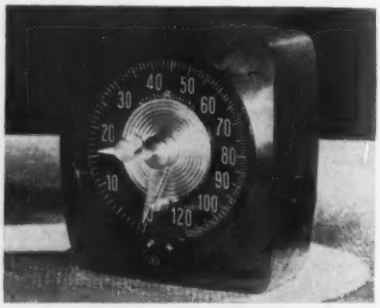
Thermometer (1113)

Weston has announced a new contact-making thermometer, claimed to combine the features of an indicating thermometer and an alarm or control device. The instrument consists of the Weston all-metal thermometer with an adjustable contact arm mounted in the glass and bezel. A screw-type terminal block mounted on the periphery of the case front provides for electrical connection. Contacts are of the magnetic type; contact arm is easily set to make contact at any temperature over the entire scale. While contact may be broken manually after an alarm has been sounded, the contacts break automatically on a temperature change of about 5%. Supplied to make contact on either increasing or decreasing temperatures.

Interval Timer (1114)



G-E's new automatic interval timer, Type T-48, is available in four models to fit a variety of applications. It is powered by a synchronous, permanently lubricated Telechron motor; operates on 120 volts, 60 cycles a-c. with a maximum load of 1,200 watts.

Photographic Meter (1115)

An improved instrument for controlling photographic exposures requiring time intervals of 3 seconds to 60 minutes has been announced by G-E. Called a totalux, this automatic photoelectric integrating exposure meter was developed for any operation where photographic exposures must be held within close limits. It is designed to operate at any illumination level between 50 and 400 f-c and in this range has a linear precision within 1%, according to the announcement. It operates on a 45-watt, 115-volt, 50/60 cycle circuit; weighs 17½ lb.

Time Switch (1116)

The Robot time switch manufactured by Miller-Harris Instrument Co. is a portable control which can be used to make home appliances operate automatically. It is equipped with a cord for plugging into any 115-volt, a-c outlet. The appliance is plugged into the outlet on the Robot, which turns both on and off automatically once every 24 hours. The on and off pointers are adjusted on a 24-hour dial.

Voltage Stabilizer (1117)

A new voltage stabilizer line offered by Raytheon Mfg. Co. includes a model claimed to be engineered specifically for building into electronic equipment where space and weight limitations are critical. This 5-watt stabilizer operates at an input voltage of 95 to 130 volts a-c, 60 cycles, single phase, with an output of 120 volts stabilized to plus or minus ½%.

PACIFIC ELECTRIC

BREAKERS

69 kv, Type JE-42

Extra-Fast Fault Interruption and Reclosures

by Motor Compressed Spring Stored Energy Operating Mechanism

Type JE-42E
69 kv 600 amps
1,000,000 interrupting kva

Type JE-42F
69 kv 1200 amps
1,500,000 interrupting kva

Fully Conform to AIEE and NEMA Adopted Standards

Generously meet the requirements of modern practice in high-speed relaying

Motor-Compressed-Spring Operating Mechanism assures high-speed dependable opening and closing, either automatic or manual; ideal for synchronizing.

High-Velocity Gas Blast, directed into the arc stream, rapidly extinguishes the arc within Pacific Electric Expulsion Chambers.

High-Speed Tripping, for opening and closing, minimizes dead time.

Low Operating Current, d-c or a-c, reduces or eliminates battery or rectifier expense.

Easy to Inspect and Maintain—Low upkeep even when fault interruptions are abnormally frequent.

Shipped Assembled—Fully tested and adjusted at the factory.

Get All Facts . . .

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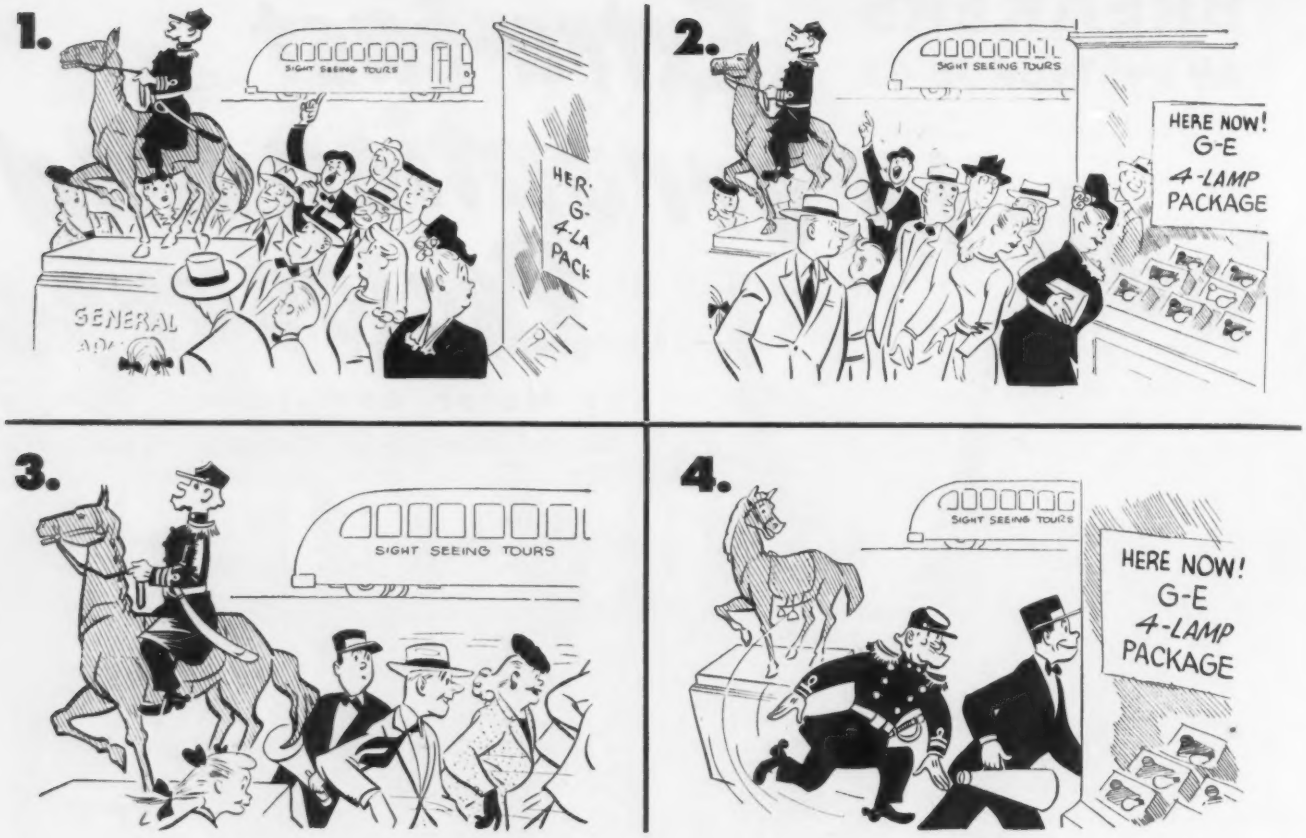
EDGAR F. HUBERT CO., 510 Statler Bldg., Boston 16, Mass.
WILLIAMSON & WILMER, 617 Mutual Bldg., Richmond 19, Va.



G-E LAMPS SELL ON SIGHT

faster than ever in the new 4-lamp package

JUST put G-E lamps up where people can *see* 'em, and they'll *buy* 'em! G-E lamps sell on sight, because: 1) they are *pre-sold* by year-in year-out advertising and 2) They're tops for seeing, because General Electric Lamp research is always at work to make G-E lamps Stay Brighter Longer.

And now the new easy-to-handle, easy-to-display G-E 4-lamp package is selling *more* G-E lamps *faster* than ever before!

NOW! 100-WATT BULBS IN 4-LAMP PACKAGES!

General Electric is now packaging *both* of the most popular sizes of G-E lamps—100-watt and 60-watt—in 4-lamp packages! Be sure to display the new 100-watt packages as soon as you get them!

NOTE TO UTILITY MEN:

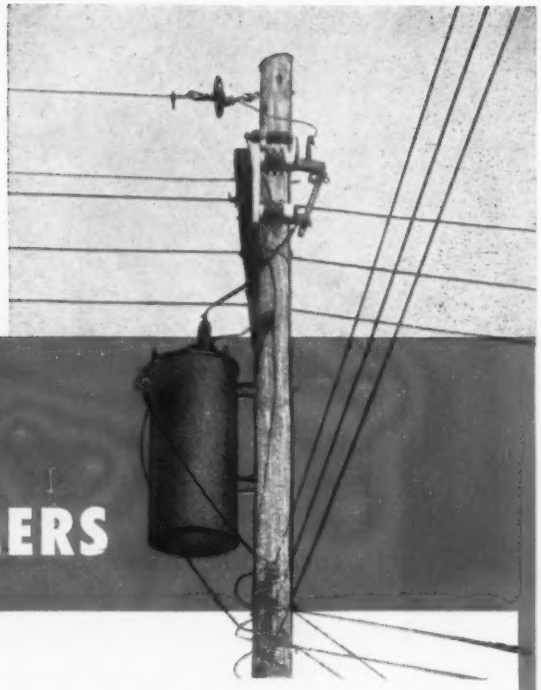
This ad, appearing in 12 dealer publications, promotes the sale of the new G-E 4-Lamp Package.

Your customers will find the 4-Lamp Package makes it convenient to keep a supply of light bulbs always on hand. There'll be fewer empty sockets—and more profitable lighting business for you.

G-E LAMPS

GENERAL ELECTRIC

SAVE TIME
SAVE EXPENSE
SAVE WORRY
CHOOSE



Wagner
POLE-TYPE TRANSFORMERS

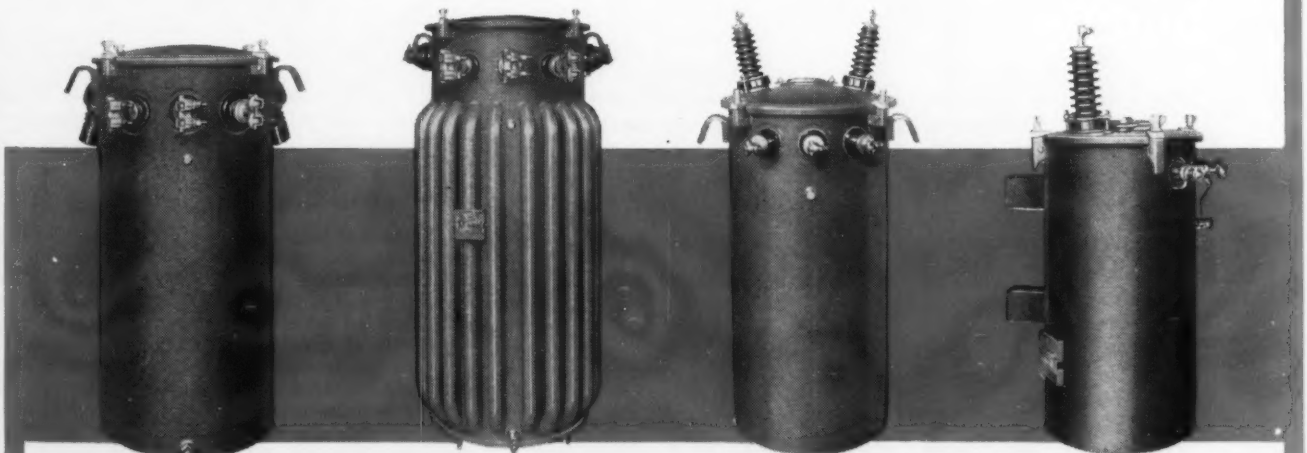
Wagner pole-type distribution transformers assure considerable savings in operation and maintenance because of their improved design, high-quality construction, ease of installation, and high efficiency. They are designed for the utmost facility in handling, operating, and maintaining.

These distribution transformers are standardized for your convenience both internally and externally. The four types illustrated show the external variations. (EEI-NEMA standards are incorporated in 60-cycle, pole-type transformers rated 100 kva and below, high voltage 15,000 volts and below, low voltage 600 volts and below).

Wagner Distribution Transformers are widely known for their excellent performance records, and uphold the Wagner reputation for dependability earned during a half century of designing and building distribution and power transformers.

Whatever your transformer requirements may be, Wagner can furnish the exact type of transformer to fit your need. Wagner has a nationwide organization to provide fast, convenient service, with twenty-nine branches located in principal cities ready to help you with your transformer problems. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.

Wagner Electric Corporation
6381 PLYMOUTH AVE., ST. LOUIS 14, MO., U. S. A.



Type HEX: Equipped with high-voltage pocket bushings. 15000 volts and below, 1½ to 100 kva.

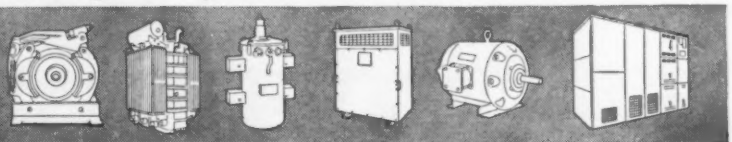
Type HEB: Equipped with sidewall stud-type high- and low-voltage bushings. Standard voltages up to 5000, 1½ to 100 kva.

Type HEK: Equipped with two high-voltage cover bushings and three low-voltage tank-wall bushings. Voltages of 5001 to 15000, 1½ to 100 kva.

Type HEF: Equipped with one high-voltage cover-bushing and from one to three low-voltage tank-wall bushings. Standard ratings through the 25 kva size in the 7200/12470Y and 7620/13200Y volt classes.

Wagner Electric Corporation EST. 1891

Consult Wagner Engineers on All Transformer Problems



BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL AND AUTOMOTIVE PRODUCTS

T48-9

KLEINS

FOR MEN WHO WANT

the Best

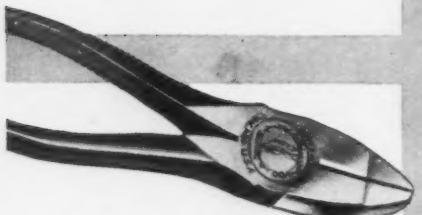
• Ever since the first communication and power lines were strung, Klein Pliers have been the favorite tools of electrical workers.

Today, Klein Pliers are made with the same exacting care that has won these tools their reputation for high quality.

Klein Pliers are still preferred by skilled workers in every field as they have been "since 1857."

No. 201. Original pattern husky Klein Side Cutting Plier. Square nose. Made in four sizes—6, 7, 8, and 9 inches.

No. 242. Klein Oblique Cutting Plier (heavy-duty pattern). A very useful tool that cuts close. Length, 6 inches.



No. 201 NE. The famous "streamlined" Klein Side Cutting Plier. Made in four sizes —6, 7, 8, and 9 inches.

No. 203. Klein Long Nose Plier. Long reach of jaws permits getting into difficult places. Made in 6 and 7-inch sizes.

The Klein Pocket Tool Guide, showing the Klein line and containing useful tool information, will be mailed on request.

Established 1857

Mathias KLEIN & Sons

Established 1857 Chicago, Ill., U.S.A.

3200 BELMONT AVE CHICAGO 18, ILL.

Current Transformer (1118)

A portable current transformer in the high-current range developed by Westinghouse is claimed to be more precise than any previously built. The unit has an accuracy of plus or minus 1/10 of 1% and five minutes phase angle over the range of current from 10 to 150% at burdens up to 0.5 ohms (ASA standard B-0.5). It has eight current ratings from 1,000 through 4,000 amp. to 5 amp.

High accuracy of the new current transformer is accomplished by passing primary current through the windings in the usual manner and then fanning out the primary conductor into a copper shell and bending it back in a "U" turn completely surrounding the windings. The effect is to isolate the secondary completely from any field but that of the current being measured.

Reluctance of the magnetic circuit is reduced by using Hipersil and by a method of winding which sets up a circulating magnetic flux. This extra flux keeps the magnetic particles in a state of agitation reducing reluctance to approximately one-half normal values and cutting errors by the same amount.

Starters (1119)

Ward Leonard has developed a new line of Bulletin 4130 a-c combination magnetic starters with circuit breakers. These starters fulfill NEC requirements for motor branch circuit overcurrent protection, disconnect means, motor-running overcurrent device and motor controller.

Each starter consists of a magnetically operated contactor with thermal inverse time delay overload relays combined with a thermal-type circuit breaker, the devices being housed in a NEMA Type 1 enclosure. Externally operated from the front, all circuit breakers have provision for padlocking in the off position and are interlocked mechanically to prevent opening enclosure door when breaker is on. They are available in five standard sizes to 200 hp., 3 phase, 550 volts, 60 cycles maximum. They can be supplied with reset button only in the cover and with local control start-stop pushbuttons or hand-off-auto selector switches.

Squirrel-Cage Motors (1120)

Allis-Chalmers has added a line of tube-type, totally enclosed fan-cooled, squirrel-cage motors ranging from 150 to 600 hp. Internally, the motor is divided into two isolated parts with each side having its own path of internal air circulation. Because of its construction, it is possible, through simple maintenance, to keep the motor free of power-destroying agents which tend to clog air passages in the conventional type fan-cooled motors, the manufacturer claims. The new line is offered with Underwriters' labels for 1-D or 2-G locations in ratings of 3,600 r.p.m., 250 to 400 hp., 1,800 r.p.m., 200 to 300 hp., and 1,200 r.p.m., 150 to 200 hp.

Regulated Rectifiers (1121)

Industrial Electronics & Transformer Co. is offering a line of regulated rectifiers for heavy-duty industrial applications. These are offered either with electronic control for fast response or magnetic amplifier control for vacuum tube elimination. Both types are fully automatic with no moving parts. Standard models offer current ranges from 5 to 10,000 amp. and voltage ranges from 10 to 500 volts.

SYLVANIA'S new 75-watt, 1½" diameter, Slimline Fluorescent Lamp gives more light per dollar than any other type of fluorescent lamp now on the market. Another Sylvania "first," this instant starting, 8-foot, hot-cathode lamp produces an average of 600 more lumens than the standard 1" Slimline Lamp. It has many applications in general and showcase illumination.

The same research and manufacturing skills that made such a lamp possible are responsible for Sylvania's outstanding achievements in the fields of Radio, Television, FM and Electronics.

ALL PRODUCTS MADE BY SYLVANIA ELECTRIC CONSUME ENERGY—MORE THAN 10,400,000,000 KWH PER YEAR

SYLVANIA ELECTRIC

WEST COAST DIVISION OFFICES: LOS ANGELES, SAN FRANCISCO, SEATTLE

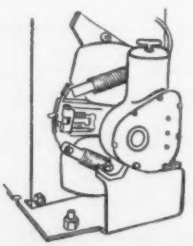
*DFR Regulator Control Holds ±1 Volt Band and is the SIMPLEST!

*DFR CONTROLS ARE EASY-TO-SET, ACCESSIBLE DUE TO UNIQUE UNIT CONSTRUCTION!

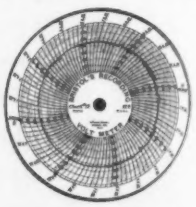
IN ADDITION TO maintaining a narrow ± 1 volt band width, the automatic control of the DFR regulator is the simplest of any regulator. With Allis-Chalmers unique unit control construction, the entire control is mounted on a single hinged chassis with a "dead front" panel. Controls are accessible . . . understandable. Relay setting is simplified because troublesome compounding or holding coils are eliminated. Elimination of these parts is possible because only micro energy is handled by relay contacts. And that's not all!

The DFR regulator requires only 8% excitation compared with the 25% excitation required by conventional regulators. High exciting current is important to you in terms of cost of equipment used for unnecessary excitation of regulators . . . in terms of installed capacitors . . . at $10 per kva . . . needed to balance high exciting current.

For further details on how you can get this simple, close voltage control, call your nearby A-C office, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2338



An oil-immersed, rugged, self centering, shock absorbing, quick-break mechanism is used.



Narrow band widths due to automatic "Feather Touch" control and full voltage integration.

DFR — the only station type step regulator you can buy for single phase duty. Sizes up to 6900 v, 250 kva. AFR — for 3 phase regulation.

ALLIS-CHALMERS

"Originators of the 5/8% Step Regulator!"

DAY-LINE* FIXTURES

now with TURRET* Sockets

Easy and Foolproof to Relamp

Now the Day-Line... already the pace-setter among industrial fixtures for simple installation, economical maintenance, and heavy duty service... simplifies the relamping problem. All 40-watt lamp fixtures are equipped with the new TURRET Sockets that make relamping as safe and easy as plugging into a wall outlet.

- **Lamps slip in instantly from either end and *stay* in. Vibration cannot shake them loose.**
- **Spring-action keeps lamps well centered... assures positive floating contact.**

RESULT:

Less lamp mortality... lower maintenance costs... more customer satisfaction. Another good reason why it pays to install the DAY-LINE for all your industrial applications!

The **DAY-LINE** Heavy-duty industrial fluorescent fixtures are designed for two and three 40-watt and two 85-watt lamps. Sturdy, porcelain enameled reflectors... truss-type channel construction... unit or continuous installations. The 40-watt fixtures are equipped with the new TURRET Sockets and open or closed end reflectors.
U. S. Patent Nos. 2317434, D-135375 and D-133458.

May we send you bulletin 3-A-2 with complete details?

*T. M. Reg. U. S. Pat. Off.

010

IT'S EASY TO SEE WHEN IT'S

DAY-BRITE Lighting

Day-Brite Lighting, Inc. 5412 Bulwer Avenue, St. Louis 7, Mo.
Nationally distributed through leading electrical supply houses.

In Canada:
address all inquiries to Amalgamated Electric Corp., Ltd.,
Toronto 6, Ontario.

R&S EVER-LOK
RECEPTACLES, PLUGS & CORD CONNECTORS
FOR HEAVY DUTY INDUSTRIAL USE AND MANY OTHER APPLICATIONS
30 AMP. 440 VOLTS. A. C.
Sturdy, precision-built construction to withstand the severest service conditions. Safe, trouble-free performance.
Advanced features include: Receptacle has fully protective hinged cover and gasket, strong spring keeps door closed and dust-tight, solderless terminals with metal shield for protecting terminals, compact design, yet large capacity. Plug contacts are precision-machined, self-wiping, and self-aligning, and positive grounding. Adjustable cord grips eliminate strain on connections. Locking is automatic and positive. Plugs and connectors entirely steel-clad, cadmium finish and with dust-proof protection. All interiors of molded phenolic material.
AUTOMATIC LOCKING PLUGS
Write for BULLETIN EL 446-10
70
Sold through Electrical Jobbers
Sales Representatives in Principal Cities
SINCE 1902
RUSSELL & STOLL COMPANY, INC.
Precision-Built Electrical Equipment
125 BARCLAY STREET, NEW YORK 7, N. Y.

SWITCH "ON" • REGULARLY
SWITCH "OFF" • AUTOMATICALLY
• ELECTRICALLY
WITH A FAMOUS TORK TIME SWITCH
PLAIN OR ASTRONOMICAL
Tork Clock Time Switches are world renowned for their dependability and accuracy. They require no regular attention, and are available in many electrical capacities for both indoor and outdoor use.
There's a TORK CLOCK for every need.
Economically priced from $9.50
Send for free literature.
TORK CLOCK CO., Inc.
1 GROVE ST., MOUNT VERNON, N. Y.

Krypton-Filled F Lamp (1122)

A 25-watt, 33-in. 1½-in. diameter, krypton-filled fluorescent lamp has been developed by Westinghouse for home, store, office and industrial use. This lamp is said to produce more than five times as much light as an incandescent bulb of equal wattage, and 50% more light than a 20-watt F lamp with only 25% more electricity. It operates on both a-c and d-c. Krypton gas, used in place of argon gas, is sealed into the lamp, enabling it to start on regular light circuits using standard 20-watt starters and low-cost auxiliaries. The lamp will be available in five shades of white, including the new warm-white. Illustration shows new lamp in left hand, a 20-watt argon-filled lamp in right hand.

And Another (1123)

General Electric is offering an 85-watt fluorescent lamp employing krypton and producing the same amount of light as the former 100-watt F lamp. The new lamp uses about 14% less electricity, according to the manufacturer, and has the same overall dimensions and the same life as the 100-watt lamp. It is explained that electrons lose only half as much energy in collisions with gas atoms in the case of krypton as they do with the lighter argon, with which fluorescent and germicidal lamps have been filled in the past. The new wattage rating was dictated primarily by the fact that the new lamp consumed only 85 watts on existing 100-watt accessory equipment, with no change in light output, the manufacturer states. Otherwise a new line of accessory equipment would have been required.

F Luminaire (1124)

Lighting Products Inc. is making a fluorescent luminaire, the Panelux, in four sizes—12x8 ft.; 16x8 ft., 2x8 ft. and 4x8 ft. The units may be used individually or in combination; may be surface or pendant mounted or inset level with ceiling or false ceiling. Louvers are made of fire-resistant fiberboard in white and in pastel shades. Louver sections are replaceable. Metal louvers are available. These units carry two, four, six or eight 96-in. Slimline lamps at 120, 200 or 300 ma. Light cut off is 38°, both parallel and transverse to the unit. U. L. approved

Germicidal Lamp Ballasts (1125)

G-E has expanded its line of ballasts for germicidal lamps. Ballasts are available now for the 8-, 15-, and 30-watt germicidal lamps, the 4-watt lamp with bent "U" tube and the radio-type base, the bayonet-base G-E T5 lamp for refrigerators, sanitary cabinets and similar appliances and the 36-in. T6 Slimline instant-start germicidal lamp.

RoZone*

Rome's ozone-resistant insulation that surpasses specifications

500,000 CM stranded single conductor RoZone insulated, shielded, RoPrene sheathed, power cable . . . 5000 volts.*

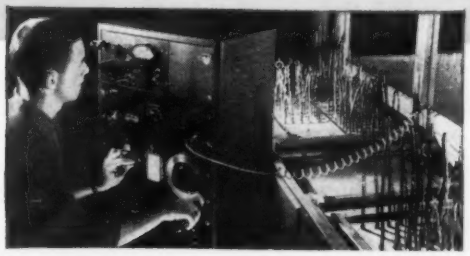
RoZone*, an oil-base, ozone-resistant insulating compound, can be depended upon for service performance "above and beyond the call of duty" . . . a *plus* value assured by *plus* quality controls. In maintaining RoZone's high standard of quality there can be no half-way measures. That is why Rome Cable control of quality goes *beyond* specification test requirements . . . to make certain that every length of RoZone* insulated cable possesses that *plus* quality for dependable long cable life.

High electrical stability in wet locations, immunity to the effects of corona and ozone, high dielectric and surge strength, and low dielectric loss, place RoZone* in an unexcelled position for higher voltage applications. For circuits of 8000 volts, or less between phases, at operating temperatures up to 75°C, RoZone* will give you a new conception of cable performance.

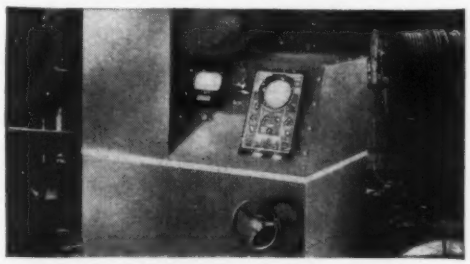
RoZone* insulated cables can be supplied with or without electrostatic shieldings and are manufactured with RoPrene (Neoprene) sheath or other conventional cable coverings as specified. RoZone* is particularly recommended for series street lighting and power distribution circuits; motor, generator and transformer leads; as well as station control and other general purpose wiring where high quality is paramount.

For complete engineering data write for your copy of Specification RO-4.

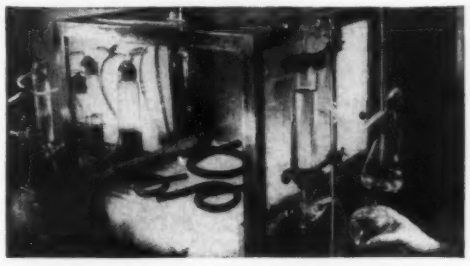
*TRADEMARK REGISTERED



Moisture resistance of insulated cable specimens is measured electrically in long time immersion tests.



Corona level of RoZone insulated cables is determined by means of this equipment.



RoZone's resistance to ozone cutting is determined by exposing specimens to ozone atmosphere.

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK

ROME CABLE ROME, N.Y.

PACIFIC ELECTRO SALES, INC., Pacific Coast Agents

SALT LAKE CITY 1, UTAH
419 Beneficial Life Bldg.

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The tube that has done most for television

has 95% NICHROME* V metal parts

THIS is the RCA Image Orthicon 5655—super-sensitive eye of the television camera and picture-getter extraordinary.

Only 15¼" long, the tube contains over 150 precision-made parts—which must not only be non-magnetic, but possess high resistance to heat and oxidation.

The alloy that most satisfactorily meets the manufacturer's exacting specifications is Nichrome V.

That is why 95% of the metal parts in the Image Orthicon 5655 are made of Nichrome V.

Driver-Harris manufactures more than 85 alloys for the Electronic and Electrical fields. These are distinguished for giving exceptionally efficient, long and economical service—not only in conventional applications, but most particularly where requirements are unusually tough. So send us your specifications. As with the Image Orthicon, it is most probable a D-H alloy will best serve your needs.

*Nichrome is manufactured only by

Driver-Harris Company

Stocked for the Coast Trade at: ANGUS-CAMPBELL, INC.

235-241 San Bruno Ave., San Francisco 449 So. San Pedro St., Los Angeles 2122-4th Ave., Seattle

Main Office and Plant: HARRISON, NEW JERSEY

*T.M. Reg. U. S. Pat. Off.

THE MAGNO-TRONIC FLUORESCENT STARTER

PROTECTS Fully automatic thermal relay with unusually long life that eliminates blinking lights and protects all auxiliary equipment.

SIMPLIFIES Replacement of worn-out lamp automatically restores closed circuit—replacement of starter unnecessary. No button to push.

REDUCES COSTS Magno-Tronic starters provide exact timing in the lamp electrode—preheating process preventing excessive loss of emission material thereby assuring the maximum in the useful life of a lamp. The established quality of this starter saves considerable time in maintenance and man hours required to repair and/or replace an inoperative lighting unit.

VERSATILE Will operate efficiently over an extended voltage under widely varying temperatures.

GUARANTEED FOR ONE YEAR

The (SP-15-20) for use with either 15 or 20 watt lamps
The (SP-30-40) for use with either 30 or 40 watt lamps
The (SP-100) for use with 100 watt lamps

Ask for descriptive literature

INDUSTRIAL ELECTRONICS CORP.

MAIN PLANT Newark 2, N. J.

Simline F Lamps (1126)

Sylvania is offering a slimline fluorescent fixture for commercial use, and recommends it particularly for buildings having moderately high ceilings. The fixture, CSL-496, is an unshielded unit using four T-8 F lamps with a total of 204 watts. It may be installed surface or pendant mounted, individually or in continuous rows but is specially applicable for surface mounting in general merchandising areas. The 4,500 white lamps are standard; other colors will be supplied when specified. A feature of the 98-in. unit is the "blunt" end design of the chassis, said to eliminate shadows when fixtures are installed end-to-end. End caps and joining bands do not have to be removed to service or relamp fixture.

Show-Case Lampholders (1127)

Kulka Electric Mfg. Co. has announced show-case type lampholders for T-6 slimline fluorescent and cold-cathode lamps. Like the larger units, these lampholders operate in pairs and work on the push-pull principle of lamp insertion and removal. Made of white urea molded plastic, they have a die cast cap of special zinc alloy, brightly plated, and secured to the body by means of two screws.

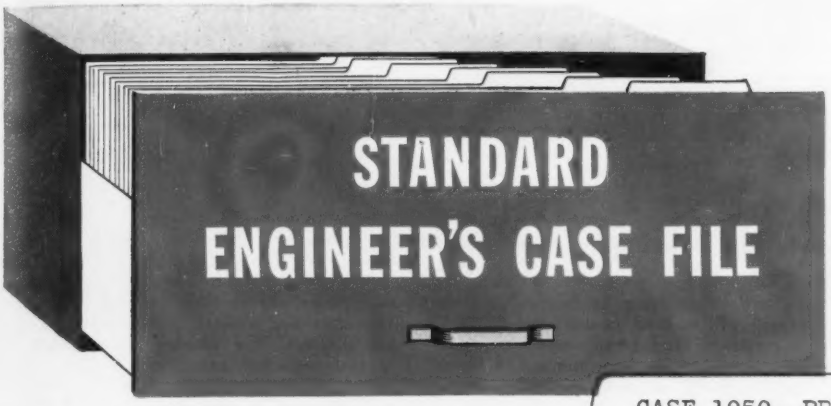
The caps are threaded for ⅛-27 electrical pipe and have an 8-40 set screw that anchors the holder to the pipe. The larger units (No. 564-566) are for the high-voltage end and the smaller units (No. 565-567) are for the low-voltage end. Only one end of lamp is inserted at a time and the current will not flow through until both ends of lamp are in place.

Runway Light (1128)

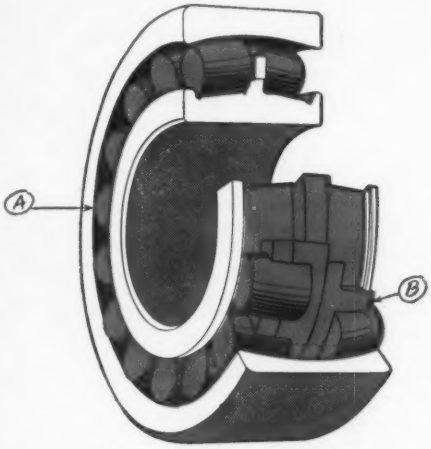
A new type BHI low-cost bidirectional, high-intensity runway light has been announced by Westinghouse and is claimed to exceed every requirement of CAA Specification L-819 and Army Air Force Specification 32957. These units can be installed as direct replacements of old-style high-intensity lights or can replace existing semi-flush contact lights. They use 200-watt, 6.6-amp. aviation lamp No. 6.6, A/T 14P with medium prefocus base. Special low-loss transformers are available, complying with CAA Specification L-806, and can be installed in any Westinghouse type AN base or in any AN type deep base.

F Lampholder (1129)

Bryant Electric Co. is offering a new duplex push contact fluorescent lampholder for use with standard bi-pin lamps. This device has beryllium copper contacts; molded bakelite terminal block with the terminal screws located on the front; spring-actuated molded bakelite discs. Neither vibration nor shock can displace the lamps, according to the manufacturer. One-piece mounting bracket is integral with the back plate. Listed as standard by Underwriters' Laboratories.



CASE 1050--PROVIDING FLUID LUBRICATION IN ANTI-FRICTION BEARINGS WITHOUT LEAKAGE.



HEAVY-DUTY ROLLER BEARING

Heavy-duty industrial roller bearings started easier and ran freer when lubricated with Calol Grease BRB-340. Specially-made for all anti-friction bearings. Apply with grease gun or by packing.

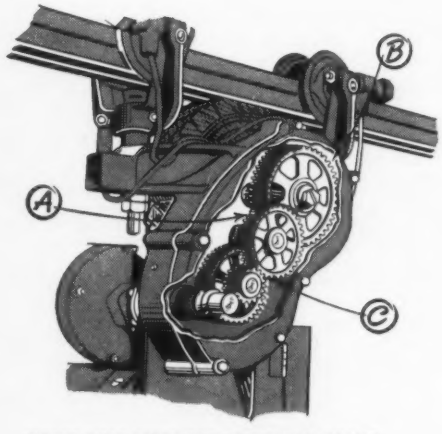
Has unusual ability - softens around roller and balls in bearings to oil-like viscosity but remains firm on outer parts. Resets quickly so oil swept aside by moving bearing parts keeps outer grease seal intact.

A. Soft consistency around moving parts of bearings lowers starting torque, reduces internal friction.

B. Firm grease forms seal that helps prevent leakage.

High resistance to deterioration under high speed conditions and extreme temperatures provides exceptional lubrication over extended periods of operation.

CASE 1062 -- MAINTAINING LUBE FILM ON HEAVY-DUTY GEARS.



HOIST GEAR UNIT FOR OVERHEAD CRANE

Viscous and tacky Calol Vistac Oils stuck tight under extreme pressures on hoist gears. Efficient for all heavy-duty gears, like industrial reduction sets. Come in six grades, 9X (SAE 10) to 45X (SAE 40). Apply by forced-feed or gravity lubricators, bottle- or wick-oilers.

A. Contain oiliness and extreme-pressure compounds. Tough film won't rupture, even on slow-moving gears with extreme pressures on wide area for long time.

B. Economical - little required to provide adequate lubrication and dissipate heat. Resist highest cperating temperatures.

C. High affinity for metal maintains lubricating film, reduces power loss and wear.

Calol Vistac Oils also recommended for lubrication of air hammers, rock drills and other air-powered tools ... atomize quickly and stay fluid at low temperatures.

Trademarks, "Calol," "RPM," Reg. U. S. Pat. Off.

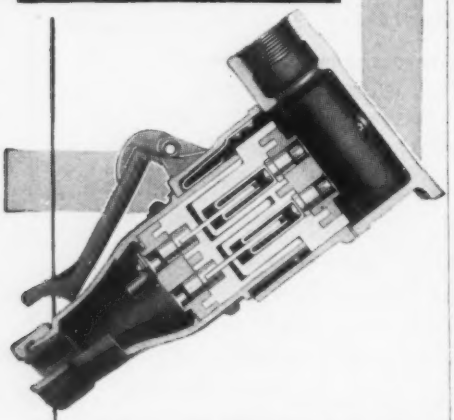
STANDARD TECHNICAL SERVICE will make your maintenance job easier. If you have a lubrication or fuel problem, your Standard Fuel and Lubricant Engineer or Representative will gladly give you expert help; or write Standard of California, 225 Bush Street, San Francisco 20, California.

RPM CALOL

FOR EVERY NEED A **STANDARD OF CALIFORNIA** JOB-PROVED PRODUCT

QUELARC

The Circuit Breaking Plugs and Receptacles . . . Ratings Up to 200 AMPERES



The exclusive QuelArc construction provides exceptional protection to contacts, for safe use as current rupturing devices. Unique partitioned insulation provides extra long distance between contacts and between contacts and ground. Insulating chambers completely enclose all contacts and form an arc-trapping space. Galvanized cast metal housings, bakelite insulation and individually renewable contacts insure long service life.

QuelArc plugs and receptacles are available in a complete range of styles, 2, 3 and 4 pole types—grounded through shell or extra pole. Housings with threaded cap, plain cap or hinged spring door. Ratings 20, 30, 60, 100 and 200 amperes, 250 volts DC, 600 volts AC. Consult your Pylet Catalog 1100, Bul. 1140-2 for complete listings.

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BULLETINS ETC.

Substation Planning (1130)

Allis-Chalmers has prepared a 20-page planning and engineering guidebook to simplify layout of its load center unit substations. Dimensional and arrangement information helps to determine floor space and head room requirements as soon as the unit is specified.

Information is given on units ranging from 100 to 2,000 kva. for distribution at 208Y/120, 240, 480 and 600 volts having both liquid-filled and dry-type transformers. Incoming line equipment ranging from metal-clad switchgear to roof bushings is covered, as well as sizes and arrangements of feeder switchgear.

This booklet may be used with Allis-Chalmers "Check List to Simplify Unit Substation Planning," to obtain additional information.

Slide-Rule Calculator (1131)

Unistrut Products Co. is offering a rapid calculating, vest-pocket, slide-rule-type beam load and column load selector. This selector is designed to estimate quickly and accurately the amount of weight which can be supported by various Unistrut sections under varying conditions of span and unbraced height. Conversely, the selector also provides the various combinations of Unistrut sections required to support a given load.

Farm Program (1132)

A new catalog of the programs in General Electric's "More Power to the American Farmer" series is available, the company has announced. It contains complete descriptions of the four present farm electrification programs: barn hay curing, farm welding, farm water supply, and farm wiring. Each of these programs is a packaged kit that contains an educational, full-color, sound film and related literature on ways to put electricity to work on the farm. They have been prepared as an aid to farm leaders, equipment distributors and dealers, power suppliers, and manufacturers. The catalog gives prices of kits and ordering instructions.

Circuit Breaker (1133)

Pacific Electric Mfg. Corp. has released Catalog 114 on its Type SW and SWA outdoor group-operated switches, tilting-insulator type, vertical break, in 7.5, 15, 23 and 34.5 kv., 400 and 600 amp., 46 kv., 600 amp. These units have solid-silver rolling contacts.

Revised Catalog (1134)

National Electric Products Corp. has published a complete revision of its Catalog CF-2 describing and illustrating Plug-In strip, a multi-outlet branch circuit assembly.

Aerial Cables (1135)

Aerial cables are described in a recent bulletin from Simplex Wire and Cable Co.

Rural Line Material (1136)

Publication of a new Rural Manual has been announced by Locke Inc. It contains characteristics and dimensions of the company's pole line hardware, insulators and associated materials.

Jubilee Booklet (1137)

"The Story of Holophane" has been published by that company to commemorate its golden jubilee.

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Name ..... Company* ..... Title* ....

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ELECTRA'S HUSBAND

"JUST how much of a threat is Communism to labor unions in this country?" Electra asked as she put down a copy of *Collier's* that she had been reading. "It says here that the United Electrical Workers union is definitely under Communist control and that a lot of other unions have been almost completely taken over by Red minorities."

"I'm not worried about what Communism will do to the unions," I replied. "The real meat of the coconut is what Communism will do to America. I get cold chills when I think of how easy it would be to sabotage communications and production and transportation in this country if we ever did get into a war with Russia. And it would stem from the fact that the Reds have infiltrated into key unions. But that's one important phase of their revolutionary strategy. Look what's happening in France."

"Maybe the French workers might fall for the arguments of a lot of Communists," Electra commented, "but I don't see how any group of intelligent Americans would be fooled by the propaganda the Reds dish out. Even I can see through the tactics that this article tells about."

"You can see through them because they are explained to you by an expert," I continued. "In the unions the tactics are much more subtle. In fact most of the members never even know what s happening."

"Well why doesn't somebody tell them?" Electra asked.

"Because by the time the takeover has been completed, it's too late," I answered. "The U.E. tried to kick out the Communist leadership and failed because 90% of the key officers were already Communists. Do you think that the stevedores here on the West Coast can throw off the Bridges' yoke? Not very soon.

"It's a strange thing but I'll wager that not 10% of the union memberships, and an even smaller percentage of the public, know what's in the Taft-Hartley affidavit that union leaders have been asked to sign. So they let it be made a big issue just as in the waterfront strike. And, in fact, I hadn't read it until a couple of days ago when John Pickett showed me a copy. Here you read it."

And I handed her a copy.

"John says that if that document is an assassin of union liberties then he doesn't understand the English language. He said that what promised to be a bitter strike at a Caterpillar Tractor plant folded in five days when the affidavit was published in the papers. Maybe the shipowners should try it."

THAT RED AFFIDAVIT

UNITED STATES OF AMERICA
National Labor Relations Board

AFFIDAVIT

For Use in Conformity with Section 9 (h) of the National Labor Relations Act, as Amended June 23, 1947

State of.....
} ss.
County of .....

I, ..., being duly sworn,
(Name)
depose and say:

1. I am.....of the.....
(Title of Office) (Name of Labor Organization)

My term of office expires on.....

2. I am not a member of the Communist Party or affiliated with such party. I do not believe in and I am not a member of nor do I support any organization that believes in or teaches the overthrow of the United States Government by force or by any illegal or unconstitutional methods.

.....
(Signature)

.....
(Address)

Subscribed and sworn to before me

this.....day of..... 19....
Notary Public in and for the County
of....., State of.....
My commission expires.....
(SEAL)

WARNING: The attention of persons filing this form with the Board is directed to Section 35 (A) of the Criminal Code which provides that any person wilfully making or causing to be made any false or fraudulent statements or representations in any matter within the jurisdiction of the Board shall be fined not more than $10,000 or imprisoned not more than 10 years, or both.

"Wouldn't sensible American working people kick the Commies out if they really knew the facts about Communism?" Electra asked after she had finished reading. "Is anybody trying to tell them?"

"Yes, a lot of companies have started giving out the facts. In our industry G-E is doing it. I've been reading some of the statements the G-E employee relations department has been giving their people. It's plain talk. There was one on Communism. In fact I've saved it. It's here in my briefcase. Let me read you some of it.

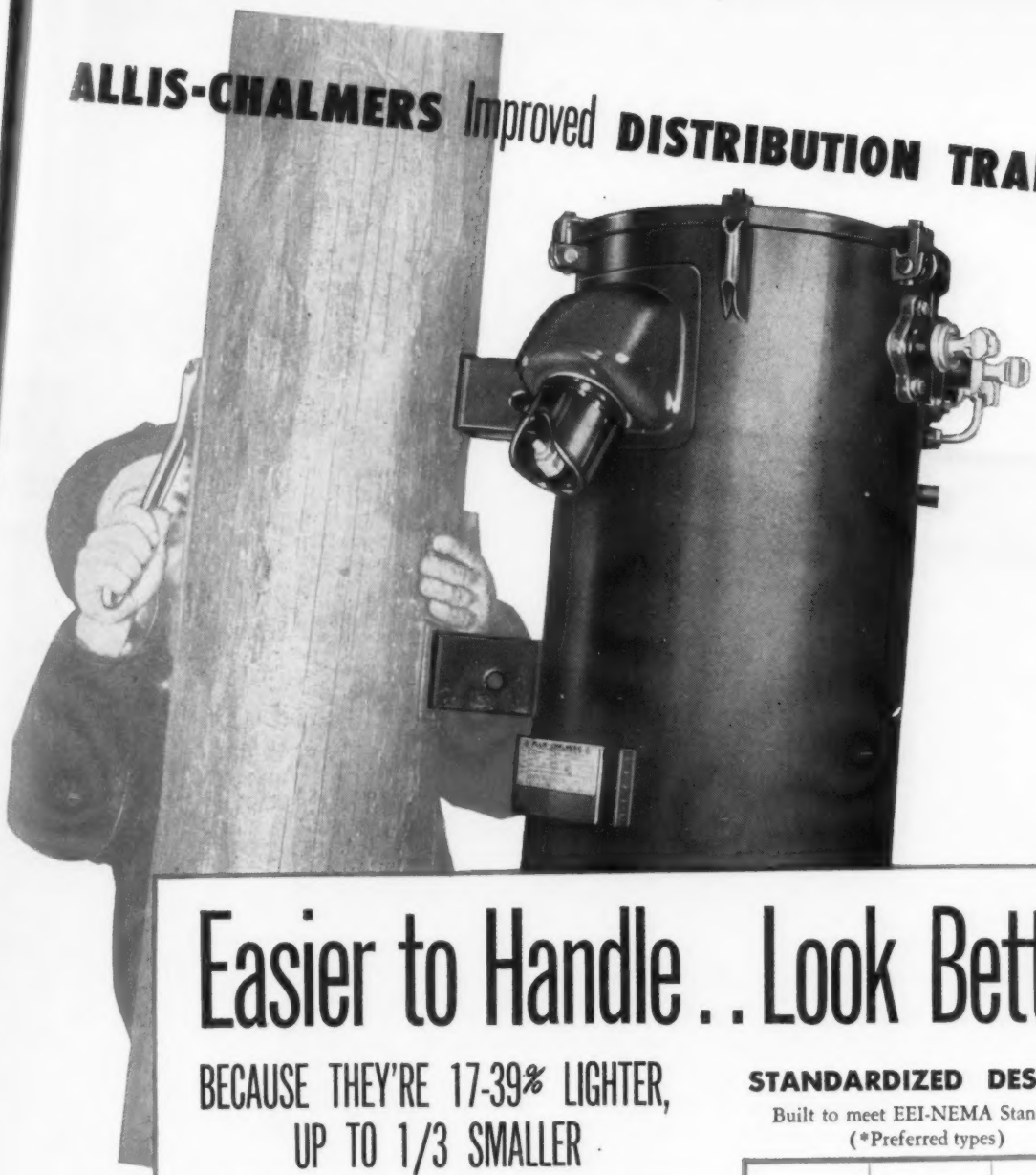
" 'Communism is not just a theory or method of government. Communism in practice has to be also a religion—a burning belief, a blind faith, an iron way of living—that worships itself. Communism requires absolute obedience in the most minute details of personal life; it permits no freedom of will, no freedom of speech, no freedom of action, no freedom of thought, no freedom of opportunity—no freedom of choice in anything. Why?

" 'Because in Communism the individual man, woman or child is of no importance . . . can express no individual ambition, no personal hope, no private plans. Humans are regimented like bees in a beehive, or ants in an anthill. Communism requires men's souls, minds and bodies—without question, without mercy, without appeal. Communism will not tolerate or live beside any other government, any true religion, any other way of life. Anything other than communism is an enemy that must be destroyed if Communism is to survive.' "

"Any real American ought to understand that kind of talk," Electra said as she rose to answer the phone. "And every real American ought to be ready and eager to clean them out."

"Some of them are," I called after her. "One of the CIO United Electrical Workers locals has voted them out. And the UWU is staging a real old-fashioned housecleaning. All union members should demand it themselves."

ALLIS-CHALMERS Improved DISTRIBUTION TRANSFORMERS



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AND THE STORY behind this *improved* transformer? It's the use of new orientated electrical core steel. This material makes possible a smaller, more compact unit . . . without any sacrifice in operating characteristics or mechanical ruggedness.

Compare these *improved* distribution transformers with our former designs. You'll find the same strong welded construction . . . corrosion resistant finish . . . careful workmanship . . . and all the other features that mean long service without attention.

* * *

Send for new 12 page Bulletin 61B6159B. It contains dimensions, weights and construction details of these *improved* distribution transformers — from 1½ to 100 kva, 2400-15,000 v. Ask a nearby A-C representative for a copy, or write ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2402

STANDARDIZED DESIGNS

Built to meet EEI-NEMA Standards
(*Preferred types)

kva	4800 volts and below	7200 volts and up
1½-25	*PBSR	*CBSR or PBSR
37½-100	*PBS	*CBS

KEY TO TYPE DESIGNATION

PBSR—High voltage pocket bushings with low voltage stud bushings in tank wall . . . round tank.

PBS—High voltage pocket bushing with low voltage bushings in tank wall . . . semi-elliptical tank.

CBSR—High voltage cover bushings with low voltage stud bushings in tank wall . . . round tank.

CBS — High voltage cover bushings with low voltage stud bushings in tank wall . . . semi-elliptical tank.

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Your customers are being told about Federal Cell-Ceil through full page advertisments every month in Architectural Forum, Architectural Record, Progressive Architecture and Interiors.

Increase your lighting sales—be ready to deliver Federal Cell-Ceil now! The Federal engineering staff will gladly advise on any installation problem. Our technical bulletin on installation techniques is also available, address Dept. CC-4.

*Trade Mark "Cell-Ceil" applied for.

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G-E Oil Fuse Cutouts give you

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- **low maintenance**
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G-E oil fuse cutouts are particularly applicable for indoor installations, for vault and subway service, and for outdoor pole-type installation where high interrupting capacity is required on 2400-, 4160-, 4800-, and 7200-volt utility and industrial circuits.

All arcing, with current interruption or switching, occurs *under oil*. The housing, with its drawn-steel tank threaded into a cast-iron cover, will withstand any internal pressures that can possibly occur within the cutout's interrupting rating. There are no exposed live parts—whether cutout is in open or closed position—and no expulsion of arc-flame.

Special arcing surfaces on the heavy self-aligning contacts keep load-carrying contact surfaces clean—make it possible to use these cutouts repeatedly as switches to open circuits under load, either with disconnecting blade or fuse links.

Full information is covered in bulletin GEA-732—available through your G-E Apparatus Office, or by writing *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

AVAILABLE RATINGS

Circuit Voltage	Max Continuous Amperes	Interrupting Rating* Max RMS Amperes
2400	100	6000
4160	200	11000
	300	11000
4800	100	5000
	200	10000
	300	10000
7200	100	3750

* *With G-E new Universal Fuse Links*

GENERAL ELECTRIC

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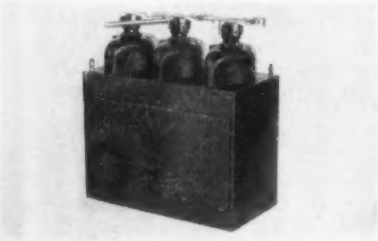
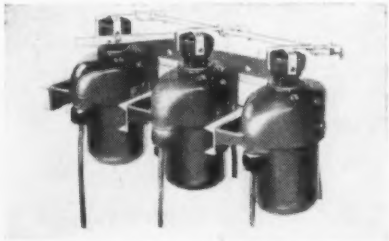
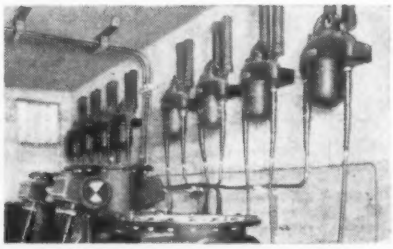


Metal-enclosed 3-phase assemblies have become increasingly popular for various indoor installations.



Gang-operating mechanism can be supplied for opening 3-phase circuits. Shown on pole-type cutouts, but also available with metal-enclosed and subway-type assemblies.



For subway service, expansion chambers attached to cutouts permit complete submersion.

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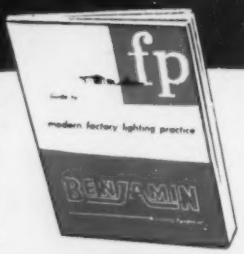
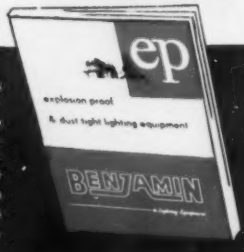
1 **FLUORESCENT LIGHTING for every location.** A report on Benjamin Fluorescent Lighting for every commercial and industrial location, and for such specialized applications as: Hazardous Locations, Dusty Environments and Damp or Humid Atmospheric Conditions. *Ask for Manual No. 1.*



2 **solutions to FACTORY LIGHTING problems.** Discusses 21 most commonly encountered problems in lighting plant locations including those pertaining to: Fire or Explosion Hazards, Dust, Adverse Service Conditions, Maintenance, Lighting for Protection of your Property. *Ask for Manual No. 2.*



3 **SAFE LIGHTING of hazardous locations.** A guide to prevent serious fires and explosions due to improper lighting. Takes into consideration atmospheres containing acetylene, gases, ethyl ether vapor, gasoline, petroleum, grain or metal dust, combustible fibers and others. *Ask for Manual No. 3.*

4 **weather and MOISTURE-PROOF lighting.** Lists and describes units designed for damp, steamy, wet or humid locations. This manual also gives you valuable information on the correct maintenance of lighting units and equipment exposed to moisture or combustible dust. *Ask for Manual No. 4.*

5 **safe removal and SIMPLIFIED MAINTENANCE of lighting fixtures.** A description and explanation of Benjamin TURN-LOX equipped incandescent lighting equipment which promotes safety, facilitates maintenance and reduces maintenance costs to the minimum. *Ask for Manual No. 5.*

6 **better lighting for better EMPLOYEE RELATIONS.** A volume of 5 reports to aid management in its consideration of all phases of Lighting as a tool to control working conditions for the benefit of employees. Has Check List for setting up Plant Improvement Plan. *Ask for Manual No. 6.*

R-2732-S

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- How to obtain efficient general illumination for industrial and commercial locations? ***Refer to Page 419, Manual No. 1.***
- How to prevent the waste of 20 to 80 cents of your lighting dollar due to improper maintenance of lighting fixtures and equipment? ***Refer to Page 27, Manual No. 2.***
- How to take proper precautions with lighting installations in atmospheres containing gasoline, grain dust, combustible fibre, and other hazardous locations which present serious fire and explosion hazards? ***Refer to Page 122, Manual No. 3.***
- How to select lighting equipment to withstand the deteriorating and corrosive influences of dampness, water and steam? ***Refer to Page 138, Manual No. 4.***
- How to provide high levels of general illumination in high bays where reflectors must be mounted over 30 feet or more above the floor? ***Refer to Page 4, Manual No. 5.***

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NOVEMBER 1948 Vol. 101, No. 5

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

WHY A NORTHWEST-CALIFORNIA TRANSMISSION LINE?

H. H. Houston

Department of Public Works, Olympia

RECENTLY it was proposed that a transmission line be built interconnecting the transmission system of the federal plants on the Columbia River with certain load areas of California. The construction of this line was supported on the statement that there will be surplus power in the Pacific Northwest at certain times of the year which can be transmitted to the load areas in the South. Before accepting such a statement, there are numerous factors which should be considered. Two are dominant. Will the Northwest have surplus power? If so, could the power be more advantageously used in that area than to transport it south? If the Northwest *did* have surplus power, what would be the transmission costs in exporting it to California? These and many other questions must be answered.

At any stage of development of the generating facilities on the Columbia River, argument can be made that there are amounts of surplus power at certain plants that could be advantageously shipped outside the area presently served by the Northwest Power Pool. With the present upstream storage, the ultimate installation of the Grand Coulee plant would have a considerable excess of energy generated from the flood flow of the Columbia in the spring and summer months. Similarly, but to a lesser degree, Foster Creek, Priest Rapids and The Dalles plants will have surpluses of flood flow power. This, however, does not mean that there would be surplus power on the Northwest system.

In attempting to visualize the amount of surplus power that will be available from the Grand Coulee plant, one must also consider the ultimate storage on the upper reaches of the Clark Fork, Kootenai and the main fork of the Columbia. The Foster Creek report of the Army Engineers includes a storage yield curve. This curve indicates that, with 25,000,000 acre-ft. of usable storage above Grand Coulee, the minimum regulated flow at Grand Coulee would be approximately 85,000 c.f.s. This flow is sufficient to sustain 100% load factor operation of 18 units at Grand Coulee. In short, there would be no surplus power at Grand Coulee from the flood flow of the stream unless construction was carried out permitting the installation of more than 18 units.

Area Load Growth

In attempting to determine whether the Northwest will have surplus or exportable power, load requirements of the area must be considered. Rate of growth of peak and average megawatts for the area are shown in Fig. 1. Rate of growth as represented by the straight line is a rate of 6.8% per annum. To date, there have been no signs of load requirements of the area reaching a point of saturation. Extrapolation of the peak megawatt trend line would indicate a peak demand of 10,000 megawatts by 1962, 14,000 megawatts by 1966 and 20,000 megawatts by 1972.

It will be well to have in mind load distribution throughout the area served by the Northwest Power Pool. Analysis indicates that approximately 67% of the peak of the system is for loads west of the Cascades. Of the total energy consumption in the water year 1948-1949, 74% is by loads west of the Cascade Mountains. All of the large generating plants in the area yet to be built, with the exception of The Dalles and John Day projects, are east of the Cascade Mountains. With the greatest proportion of peak loads and energy consumption west of the Cascades, it can be clearly seen that important transmission line construction must be from east of the mountains to the areas along the Coast. This means that the greatest proportion of the new transmission lines to be built in the immediate future will be lines from the generating sources through the mountain passes and down the Columbia River Gorge to areas along the Coast.

Total Area Hydro

Having in mind load growth and load distribution, the amount of potential hydroelectric power available for serving this increasing load must now be considered. This total potential hydro is an elusive thing. It is easy enough to take the original 308 report of the Army Engineers, together with subsequent revisions, and apply the formula P100 equals 0.0746 times c.f.s. flow times net effective head and obtain a figure of total potential hydro power on the Columbia and its tributaries. To this figure can be added the additional power possibilities on the smaller rivers west of the Cascades. The c.f.s. flow of the above formula can be varied by the amount of storage on the upper reaches of these rivers. On this basis, it is probable that the over-all figure of potential hydro might approach 30,000,000 kw. This figure, however, is determined without consideration of the economic factors of generation and transmission and without consideration of the desires of the people living in areas which would be flooded by the immense storage reservoirs necessary to obtain a

maximum of sustained flow in a critical water year.

Calculations show that, for an upstream storage of 11,000,000 acre-ft. on the Columbia and reasonable storage on the principal tributaries, the total hydro in the area would be approximately 15,000,000 kw. With reasonable success in obtaining additional upstream storage, it would be possible to increase the total installed hydro capacity to 20,000,000 kw.

Based upon the foregoing load estimates showing that by 1972, load will have reached 20,000,000 kw., then by that time the 20,000,000 kw. potential will have been exhausted. In other words, if all potential hydro were developed it would meet load needs for only about two decades, more or less, depending upon whether the optimistic figure of 20,000,000 kw. is used or the more conservative figure of 15,000,000 kw. is finally realized.

Having reached the limit of hydro potential in this area, the question immediately arises—what next? The answer is to be found in some type of steam plant. The source of energy for this steam may be coal, oil or atomic energy. It is quite possible by the time hydro resources of the area have been exhausted that the gas turbine will have been perfected to the point where this type of prime mover may have its place in the over-all economics of power supply in the area.

Power Cost Trend

Cost of power very definitely enters into the over-all picture. Approximate trend in the cost of power delivered at receiver substations in the principal load centers of the Pacific Northwest is shown in Fig. 2. The first federal projects on the Columbia were built at a time of relatively low costs. They were multi-purpose projects. A portion of the construction costs was borne by navigation and irrigation. Power from these multi-purpose projects has been sold for less than 3 mills per kwh. This is an "on the system" price on the low side of transformer banks at the principal receiver substations. Cost of this power is typical of the cost of multi-purpose projects in the period 1936 to 1940. This was taken on the starting point on the curve.

The Army Engineers' report on Foster Creek, considered one of the best of the potential developments under consideration, shows a cost of approximately $286 per kw. for the first nine units of this project. These would absorb the prime flow of the river. The 1940 costs given in the report were multiplied by 1.9 to obtain present-day costs. If a figure of $100 per kw. is added to plant cost for transmission and substations, a figure of $386 per kw. is arrived at. Assuming total annual cost to be 10% of investment, this gives $38.50 per kilowatt-year as the most of the units absorbing the prime flow of the river. At 100% annual load factor, this is equivalent to 3.2 mills per kwh. at the project, or 4.4 mills per kwh. at the load center. This latter figure was used as the intermediate point on the power cost curve.

The final point on the curve, indicated as occurring in 1972, is based on the cost of steam. Hydro by that time will certainly have been exhausted. Steam cost is based on burning oil at $2.50 a barrel, which is equivalent to an "as fired" cost of 40c. per million B.t.u. With an assumed over-all efficiency of 11,000 B.t.u. per kwh. from "as fired" to "send out" or 570 kwh. per barrel of oil, the fuel cost is 4.4 mills per kwh. In the most economical design of a steam plant, fixed and variable costs are approximately equal. In this basis, this figures a net cost of about 1c. per kwh. for steam power. If an atomic energy plant had been assumed instead of oil, the costs would have been about the same, based on present-day type of equipment.

Consider the transition from the 1936 cost of less than 3 mills to the figure of 1c. per kwh. in 1972. Increases in cost between 1936 and 1948 are almost entirely increases in cost of labor and materials. In Fig. 2, it has been assumed that no further increase occurs in the cost of either material or labor. On this basis the cost of energy from the Foster Creek and Priest Rapids plants should be approximately 4.4 mills per kwh. As additional plants are developed, the tendency will be for the costs to become greater by reason of two factors. First the higher per kilowatt installation cost and second, greater transmission line liability. So much for costs.

Molding Load to River Flow

Before it is possible to determine the relative advantages and disadvantages of transfer of electric energy and power outside the area served by the Northwest Power Pool, the value of power in the area and the value of power which might be transmitted to a load center remote from the area must be considered. It is quite evident from what has been said previously that the transmission of base load power to outside areas would only hasten the day of use of higher-cost hydro and ultimate installation of steam generating units.

This raises the question of whether or not there is surplus power generated from the flood flow of the Columbia which can better be used in those remote areas and for which use cannot be found in the area served by the transmission system of the Northwest Power Pool. Some of the more important uses of power generated from the flood flow of the Columbia River are:

1. Irrigation.
2. The processing of agricultural products during the period March to October.
3. Maintaining the level of ponds of hydro plants with storage.
4. Seasonal use of power where end-product may be stored.
5. Economy flow of power to conserve hogged fuel and oil in industrial plants normally consuming these fuels during the months of flood flow.

Perhaps the greatest advantage accruing to the Pacific Northwest from power generated from the flood flow of the river is in its use for irrigation pumping. Incremental cost of additional units in a hydro plant, even at present-day costs, is approximately $80 a kw. The peak loads in the Northwest occur at times of minimum flow on the Columbia. Northwest Power Pool records show that the January peak of the system is 17% greater than the August peak. This operating condition can be stated in another way. By using the 585,000 kw. of generating capacity represented by the difference in winter and summer peaks to produce energy from the flood flow of the Columbia, there will be sufficient energy for pumping water to irrigate 1,500,000 acres under the same pumping conditions as will be required for the Coulee Basin project. Incremental cost of this additional energy is zero. In actual accounting, it would probably be better to split the total annual cost of these units which can serve both for peaking in the metropolitan areas in the winter months and for pumping in the summer on a 50-50 basis. This would mean that the "on the system" cost for irrigation pumping and for peaking would be $4 a kilowatt-year.

The second item in the list is the processing of agricultural products. Certain systems in the Rocky Mountain areas have been particularly successful in developing industrial process using agricultural products as raw materials. A considerable block of flood flow power from the Columbia could be used in electric cooking and associated processes in canneries and industrial processes deriving their raw materials from agriculture.

The third item relates to storing of flood flow power in the reservoirs of existing storage-type hydro plants. With flood flow power continuing to be available in the average year into the first or second week in October.

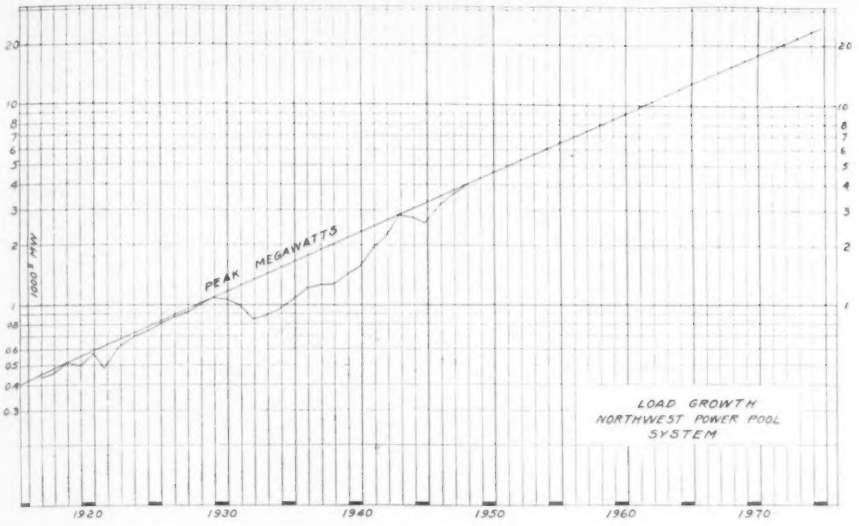


Fig. 1

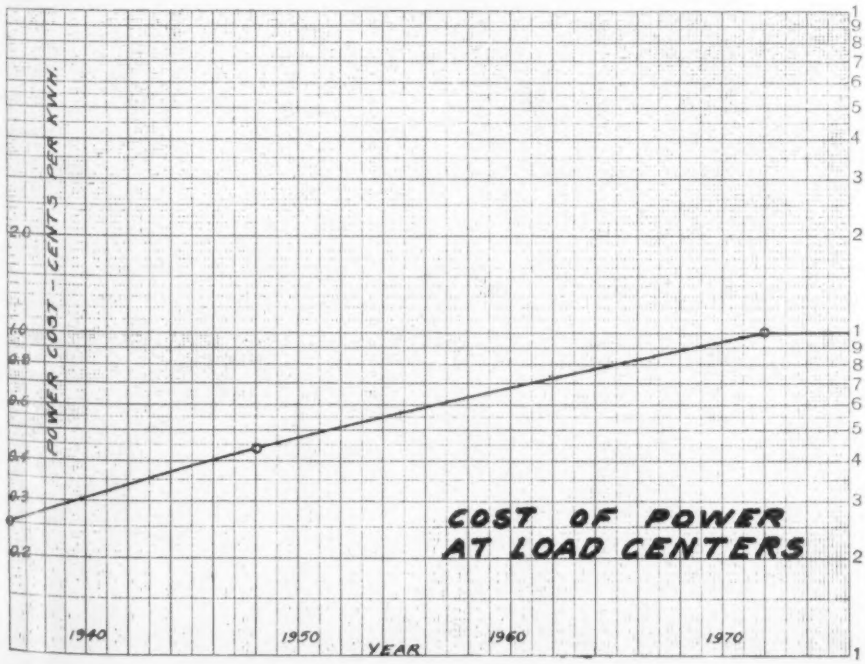
it should be possible to maintain the pond levels in all the storage plants until at least the middle of September, substituting energy produced from flood flow of the Columbia for energy produced from storage draft.

The fourth item relates to use of flood flow power in the production of such items as products of electrochemical processes where the ratio of fixed charges of additional processing equipment to the cost of electric power is such that additional plant capacity operation during the flood flow period can be justified. A possible example of this condition would be the operation of additional pot lines in the aluminum plants between the first of April and the first of October. In this case, the pig aluminum can be stored for further processing at a later period. Precisely this very thing was done during the past summer when the Bonneville Power Administration permitted the aluminum industry of the Northwest to use flood flow power for additional aluminum production.

The last item is that of the economy flow of the power replacing steam and electric energy generation now being accomplished by fuel-burning plants. Examples are to be found in the pulp mills and sawmills in the Northwest. These industries grew up in a period when fuel cost 7c. per million B.t.u. Hogged fuel, a by-product of both the pulp mills and sawmills, was once considered a by-product to be burned simply to get rid of it. Today there are hydraulic barkers. The amount of hogged fuel in a pulp mill has decreased until it furnishes less than 10% of the energy required in the process. In a sawmill using hydraulic barkers, the outside slabs which once furnished large quantities of hogged fuel are now chipped to produce chips for Kraft mills. The value of these chips is such that a sawmill can afford to burn oil rather than to take these slabs for hogged fuel. In numerous instances, oil is being used to supplement hogged fuel as a source of energy in these processes. Flood flow power might well be used to replace oil burning during the months of April through September.

To summarize, it would seem unreasonable to construct transmission lines to export electrical energy produced from the flood flow of the Columbia until an effort has been made to mold this power into the industrial and economy of the area and until the fullest use has been made of this low-cost source of energy right here at home.

Fig. 2



Cost of Power Transmission

Transmission lines cost money. This is particularly true in an area served almost entirely from hydroelectric plants. We see a great many photographs of transmission lines with their steel structures perched on a mountain side with the crossarms, insulators, and conductors forming geometric patterns extending to the farthest horizon. One might almost suspect that these lines are the heroes of these great systems rather than the blackguards that they really are.

A reasonable cost figure for transmission of blocks of power of magnitude of 100,000 to 200,000 kw. for distances of 100 to 200 miles is 1 to 1.25 mills per kwh. per 100 miles. A transmission voltage of 230,000 is reasonable. For transmitting larger blocks of power greater distances with proper line compensation, blocks from 200,000 to 300,000 kw. can be transmitted distances up to 600 miles at a cost as low as one-half mill per kwh. per 100 miles. For this transmission, voltages between 300,000 and 400,000 volts are more economical. In this discussion, one-half mill per 100 miles has been considered reasonable for large blocks of power over long distances. For the more moderate voltages and distances, 1 mill per 100 miles has been used. Both figures are assumed to be for 50% load factor operation.

Let us consider the effect of transmission on the cost of hydro power delivered at the load centers along the Coast. If the next development were to be the Foster Creek project, approximately 130 miles of transmis-

sion would be required to the Puget Sound area. The cost of transmission would be 1 mill per kwh. If the Hell's Canyon project on the Snake River were to be used as a source of energy for the Portland load center, a distance of approximately 350 miles, transmission costs would be 1.75 mills per kwh. If power from the new Hungry Horse project is to make up the energy deficiency in the Puget Sound area, transmission costs would approximate 2.5 mills per kwh. It is evident that the cost of water power delivered at the principal load centers increases rapidly as transmission distances increase. Ultimately the sum of production costs at the project and transmission costs will equal the cost of a steam plant installed at the load center.

California Transmission Impractical

Now, finally, let us consider the justification of a transmission line from the federal projects along the Columbia to load areas as remote as San Francisco. The transmission distance is approximately 1,000 miles. The system of the Pacific Gas and Electric Co. is installing 1,500,000 kw. of generating capacity between now and 1951. According to the report of the National Security Resources Board, Region VIII, for the Federal Power Commission, which is the Northwest area under discussion, will have 433,000 kw. of reserve capacity by the winter of 1949, 550,000 in 1950, and 900,000 kw. by 1951. These figures are all based on an adverse water year. Under conditions of the medium water year, the reserve capacity in 1951 will be 1,300,000 kw. Under these conditions, it certainly cannot be considered that a California transmission line is being built from a generating source to a load. The distances are too great to consider the transmission line as a source of reserve diversity. By reason of the fact that the system of the Pacific Gas and Electric Co. has seasonal peaks in August and in December which are approximately equal in magnitude, there is no seasonal load diversity between the two areas. As both California and the Pacific Northwest are in the same time zones, there is no important daily load diversity to be scheduled.

There then remains but the argument that water power is free and should be used to conserve our natural resources such as oil. The cost of fuel on the PG and E system weighted by the relative quantities of oil, natural gas, hogged fuel and acid sludges is something less than 24c. per million B.t.u. as fired, which is equivalent to oil at $1.50 per barrel. Based on the efficiency of the new steam plants being installed by PG and E, fuel cost per kwh. of net plant output is 2.6 mills per kwh. It is indeed difficult to justify even on the basis of conservation of raw materials the transmission of surplus power to California. If we consider the value of this surplus power at 2.5 mills at the sending end and 5 mills transmission expense, it would make 7.5-mill power — which certainly cannot be competitive with power from a California steam plant with fuel increment of 2.6 mills per kwh.

Conclusion

Surplus power will be available each year from the flood flows of the Columbia River. The amount of this surplus power will vary with river flow, the amount of upstream storage, and the degree of development of generating plants on the river.

Most of this surplus power can be used in the Northwest by industry and agriculture. This is the most important source of low-cost power for irrigation pumping. It would seem to be in the best interest of the economy and orderly development of the Northwest to reserve this power for use in the immediate area until such a time as agriculture and industry have had an opportunity to mold processes to use this power.

The cost of transmitting large blocks of power from the Columbia River into central California is excessive. If a reasonable transmission cost is added to production cost, Columbia River power is not competitive with power generated adjacent to the loads in California.

One other factor to be considered is the fact that exporting of power only hastens the day when power from high-cost steam plants will be required in the Northwest.

The answer to the question "should a transmission line be built interconnecting the federal system of the Northwest with certain load areas of California," therefore seems to have been answered with an emphatic *no.*

It will not reduce the cost of power to users in California. It will retard development in the Northwest. Why, then, was such a line proposed?

Preparing Nine Mile dam of Washington Water Power Co. for flash boards that will raise the height of the dam 10 ft. and increase plant capacity 2,000 hp. Every little bit helps in critical power situation confronting Northwest utilities

Southwest Power Outlook Favorable

POWER supply outlook for the Pacific Southwest is favorable according to spokesmen for the utilities participating in a fuel and power panel discussion at the annual meeting of the California Manufacturers Assn. held in San Francisco, Oct. 7. N. B. Hinson, vice-president, Southern California Edison Co., reported for his company and the Pacific Southwest area as a whole; J. B. Black, president, Pacific Gas and Electric Co., spoke for his company. Said Hinson:

"It now appears, barring a disaster, and with the continuation of daylight saving time into January 1949, that resources of the area will be adequate to meet the demand. Due to unavoidable delays incident to the installation of additional generating capacity and unprecedented load growth in the Pacific Southwest, including Arizona and Nevada, as an aftermath of war, the facilities of the area have been taxed to the utmost to provide electric power over the past several months.

"During 1948, 27 billion kwh. will be generated in the area with a December peak of 4.6 million kw. Output will be 10% greater than the 1947 output. It is estimated that the December peak of 4.6 million kw. will be 365,000 kw. less with daylight saving time than it would be if standard time were resumed.

"On Jan. 1, 1948, 5.1 million kw. of generating capacity were installed in the area, of which 34% was in fuel plants. During the year, 548,000 kw. of new generating capacity have been placed in service and 175,000 kw. are scheduled for December, with 175,000 kw. more for January 1949, a total of 350,000 kw. in the next few months. When the new additions are placed in regular operation, it is anticipated that the need for continuing daylight saving time will be removed. The total new generating capacity scheduled for 1949 is 733,000 kw.

"From Jan. 1, 1948, to Dec. 31, 1951, additional generating capacity to the extent of 2.9 million kw. will have been placed in operation in the area. This will increase the installed capacity to 8 million kw., an increase of 58%, in a period of four years. At the end of 1951, 45% of the generating capacity will be at fuel plants, which will give added protection against the recurrence of a dry year. The situation appears to be under control and, assuming that delivery and construction schedules are maintained, the resources within the southwest power pool will be adequate to meet the demand for power."

PG and E Program

Black said in part: "When wartime controls were removed, Pacific Gas and Electric Co. initiated a construction program designed to restore its depleted reserves and to provide for the extraordinary postwar growth in the area served by the company. By the middle of 1951 we will bring into operation on our system 1,300,000 kw. of new hydro and steam generating capacity. In the same period the Bureau of Reclamation expects to complete the Shasta and Keswick plants, with an additional 200,000 kw. of dependable capacity. Together this means one and one-half million kilowatts of new power for northern and central California.

"Substations, transmission and distribution lines are necessary to bring power to the ultimate consumer. We are building these facilities all over the area. As an example, one substation alone in San Francisco, with necessary connecting cables and other facilities, will cost more than $8,000,000. We are looking beyond 1951. Already application has been made to the Federal Power Commission for a license to develop additional hydro on Kings River. If and when a license is granted and arrangements made with irrigation interests for the use of water, we will increase the dependable power output on this stream by more than 250,000 kw.

Gas Supply

"The extraordinary postwar growth in California has also had a serious impact on our gas supply. Use of gas is increasing as rapidly as the use of electricity. At the same time gas reserves in California are declining. The reserves of the state have been estimated by the Department of Natural Resources to be slightly over 10 trillion cu. ft. Last year net withdrawals were about 585 billion cu. ft. California's gas reserve is therefore 17½ times the use in 1947. Roughly one-third of the 1947 use was by the gas utilities in northern California, one-third by those in the South, and one-third by the petroleum industry. . . . Studies showed that reserves in Texas and Oklahoma appeared adequate to justify the construction of a transmission line with a daily capacity of 305,000,000 cu. ft. by the El Paso Natural Gas Co. and the gas companies in southern California. Initial deliveries through that line were begun last year.

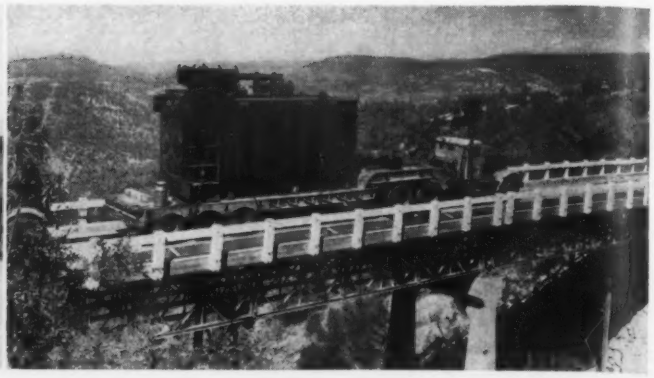
"Contracts were then made providing for the release by the southern companies to PG and E of up to 100 million cu. ft. per day from the California fields. In the meantime our investigations and studies were continued, and the development of additional reserves has made possible the entering into a contract recently with the El Paso Natural Gas Co. which contemplates bringing into the San Francisco Bay region from 350 to 500 million cu. ft. of gas per day. The El Paso company will construct a line from the gas fields to a point near Needles, Calif. PG and E will build from Needles up the west side of the San Joaquin Valley by way of Bakersfield into the Bay area. This line will cost upwards of $150,000,000. PG and E's section alone will be 500 miles long and will cost approximately $60,000,000.

"By the end of this year PG and E will have spent $300,000,000. The company will spend about $150,000,000 this year and not much less in 1949 and 1950. By 1951, total assets of the company will probably exceed one and one-half billion dollars, approximately twice what they were ten years ago.

"Our confidence in the continued development of industry, agriculture and business in the area we serve is demonstrated by our investment of new capital at the rate of 12½ million a month, or more than $400,000 a day."

H. R. Cuyler, Standard Oil Co., assured manufacturers they need have no worry over future oil supply. Within a few months, he said, California will be producing at the rate of one million barrels a day. This production, together with expanded facilities, will take care of immediate foreseeable needs. When California oil will not meet needs, oil will be imported, said he. Standard is building five huge tankers and the industry is contemplating a pipe line from Texas. California is not going to run out of oil, he declared, emphatically.

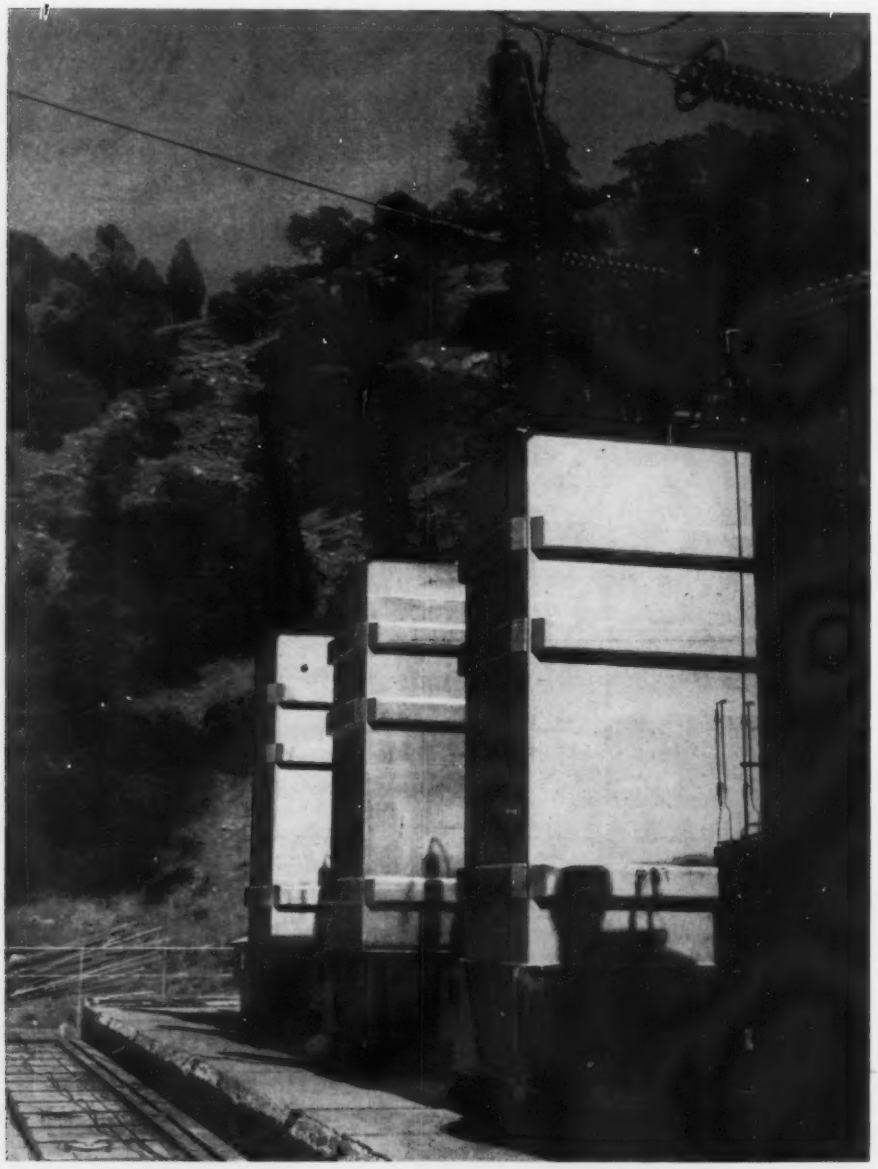
R. E. Mittelstaedt, president of the California Utilities Commission, and L. S. Wing, regional engineer, Federal Power Commission, also participated in the panel, outlining the functions and duties of their respective bodies.



Hauling large power transformers on their sides is new method of shipping. Left, 25,000-kva. unit of semitrailer with tank truck pusher. Right, 97,000-lb. load passes over reinforced mountain bridge on way to Big Creek plant

MOUNTAIN HAULING MADE EASIER

Transformers go into service after being uprighted upon arrival at their destination. Bank rating is 75,000 kva., with forced-oil and water cooling

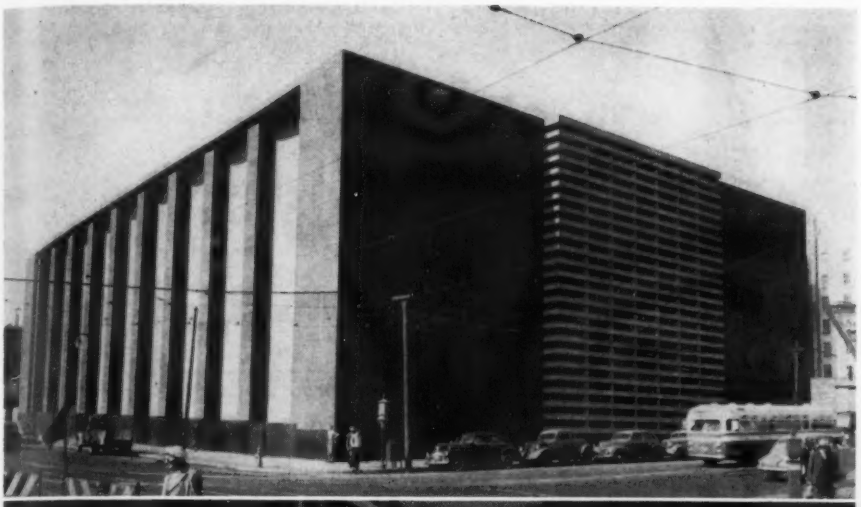


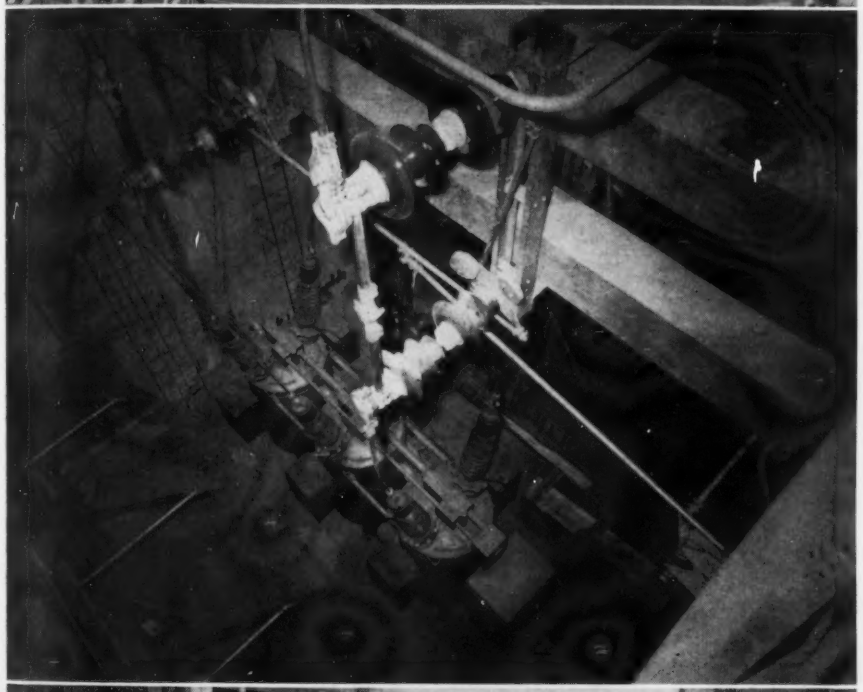
AS AGAINST THE OLD DAYS when large transformers for hydro plants in the mountains had to be trucked in in an upright position with top section of tank removed, and on occasion have been known to tip over, the modern method is to lay the transformers in a horizontal position as here pictured. This method of hauling has been made possible by transformers of new design which can be shipped completely assembled except for radiators, bushings and oil. The accompanying photographs show a truck caravan on its way to the Big Creek No 3 plant of the Southern California Edison Co., high in the central California Sierras back of Fresno.

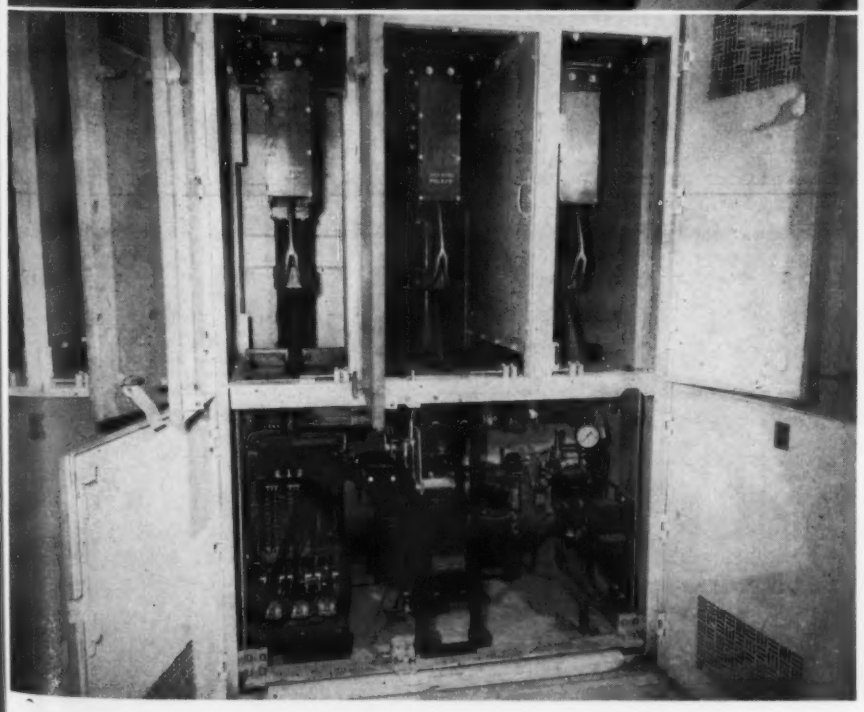
The unit shown is one of four constituting a bank of three and spare required when a fourth 35,000-kva. generator was installed at Big Creek. They are of the shell-form, form-fit Westinghouse design, rated 25,000 kva., FOW (forced oil, water cooled with external heat exchangers). Voltage is 13.2/230 kv. Transformers of this type are internally braced so that they may be shipped on flat cars on their sides; skidded onto semitrailer in the same position and hauled to destination. First shipment to the West Coast of transformers of this type was the 250,000-kva. bank installed at Snohomish substation in Washington (ELECTRICAL WEST, April 1948, p. 70).

To get the transformers to Big Creek over 55 miles of mountain road, it was necessary to reinforce a bridge for the 97,000-lb. gross load. The caravan consisted of tractor and semitrailer with truck for pusher on the heavy grades. A tank truck was used for the pusher so that transformer oil could be hauled at the same time.

The 55-mile haul was made in ten hours per trip and on consecutive days—remarkable in itself as compared with hauling transformers in the upright position.







$8,000,000 MISSION SUB

MISSION substation of Pacific Gas and Electric Co., located in downtown San Francisco, is an excellent example of how one utility is providing more capacity for the business section of a large city. The station incorporates a number of interesting features. Located at Eighth and Mission streets near the heart of the city, its architecture had to be given special consideration. As may be seen by one of the accompanying photographs, the building is ultramodern and of striking appearance. Indirect vertical fluorescent illumination will make it a thing of beauty at night.

Another very special consideration was the matter of soundproofing to avoid a noise level that might disturb guests in a near-by hotel. The station will have two 35,000-kva. and one 50,000-kva., 3-phase transformers fed by two 120,000-kva., 110-kv. gas-filled cables to bring into San Francisco's business district a quarter of a million kva. of additional capacity. One of the 110-kv. cables will come from new Hunter's Point station "P" steam plant; the other from Martin substation, a transmission terminus in the southern part of the city.

A 110-kv. ring bus, new to PG and E, will be used on the high side of the transformers. Low side of the transformers is 12 kv. There will be eight tie cables to other stations in the downtown area, each having a reactor and a 1,000,000-kva. compressed air breaker. Thirteen 12-kv. feeders will have reactors, 500,000-kva. magnetic air-blast circuit breakers and step-type regulators.

Mission substation of Pacific Gas and Electric Co at Eighth and Mission streets will bring in 120,000 kva. of additional capacity to feed into the utility's 12-kv. underground primary system. Special attention was given to architectural features as may be seen

Looking down into 110-kv. oil circuit breaker cell. Large 3-phase power transformers are located in adjacent cells. Building was thoroughly soundproofed to prevent raising noise level of the area to objectionable value

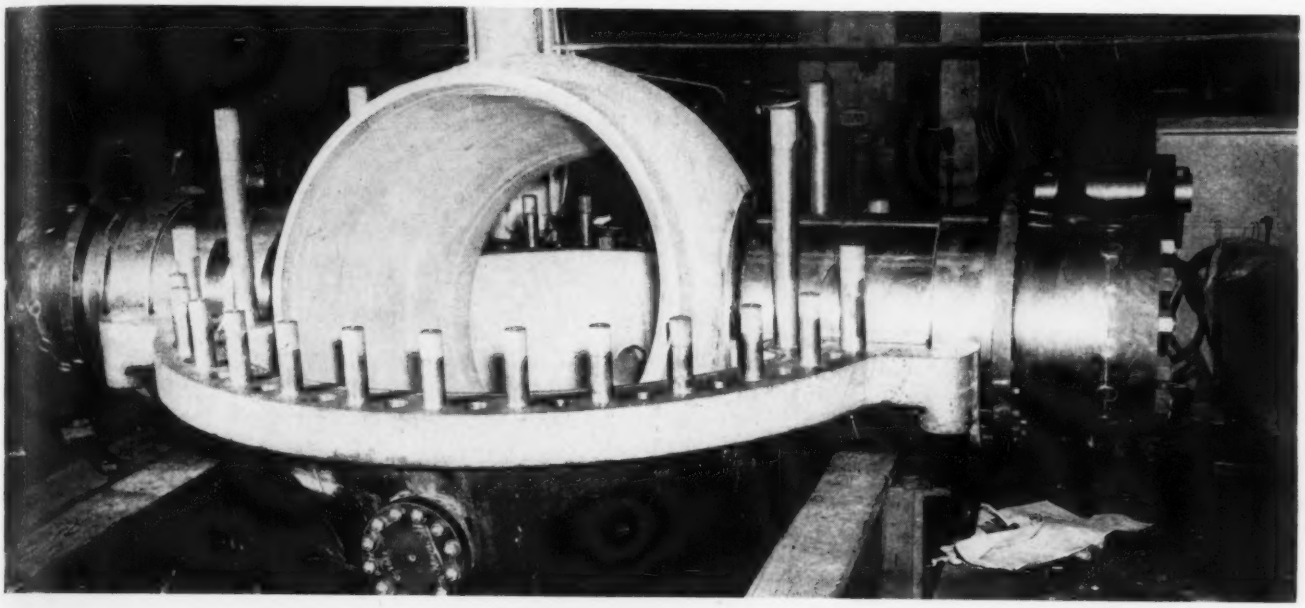
12-kv. air blast circuit breaker, one of a number of such breakers on outgoing feeders. Circuits also have reactors to reduce short circuit duty

Line Rebuilt as Brush Fire Rages

THERE are innumerable cases of quick restoration of electric service and of heroism of workmen in the aftermath of storms, floods, tornadoes and other catastrophes that befall public utilities. None have more drama than the rebuilding of a 12-kv. distribution line by workmen of San Diego Gas & Electric Co. while a brush fire was still raging. Fire had swept down from the vicinity of Barrett Dam in the mountains east of San Diego, destroying two miles of very important 12-kv. line.

As the accompanying pictures show, crews moved in while the fire was still burning to rebuild the line. Twenty-three new poles were set and six miles of wire strung—all in less than 48 hours. Material-laden trucks and mechanized equipment were rushed to the scene from San Diego. Crews worked all one afternoon and far into the night, finishing the job the next afternoon.

Good equipment, well trained crews and proper coordination enabled the San Diego utility to expeditiously perform an unusual job under emergency conditions.



New Type Hydro Valve

TYPE OF SPHERICAL VALVE installed at Bridge River hydro plant of B. C. Electric Railway Co. First of three 50,000-kw. units in plant went on the line Oct. 24. Feature of the 54-in. Pelton Water Wheel Co. valve is the spherical plug having a cylindrical passageway of the same diameter as the penstock thus limiting friction loss through the valve when in the open position to that of an equal section of straight penstock. Valves of this new type will be installed for turbine shutoff on the three Pelton 62,000-hp., 1,118-ft. head, 300-r.p.m., six-nozzle vertical impulse turbines at Bridge River. Photograph shows valve with top half of housing removed. Operating mechanism consists of two hydraulic servomotors, each mechanically connected to a lever at each end of the valve shaft. Water from the penstock, under penstock pressure, is utilized to actuate the servomotor cylinders. Safety devices are so arranged that the valve cannot be opened until the pressure is equalized on both sides of the valve by means of a by-pass. Plug rotates through 90°.

Fish Hauled Around Dams

FISH being transferred from hopper to Corps of Engineer's tank truck at Puget Sound Power & Light Co. dam on White River near Buckley, Wash. Salmon are transported upstream 6 miles and released above Mud Mountain Dam, built by Army Engineers just before the war. Method of handling during past three years is being replaced with new facilities by which fish will travel up a series of weirs at power company's dam and into a holding pool. A scoop-like brail in the bottom of the pool will be raised to permit counting of fish before being transferred into a submerged hopper. The hopper will then be elevated and the fish released into a tank truck. Two trucks equipped with pumps for circulating the water to provide sufficient oxygen will be used for the journey upstream. A three-year record under the temporary set-up indicates that this method of transporting fish around dams is entirely successful.

Low Power Factor in Industrial Plants—
and what to do about it

W. C. King
Los Angeles

II. SYNCHRONOUS OR INDUCTION MOTOR?

EXCEPT in those cases where a slow-speed motor is purchased because space will not permit a high-speed unit with belt drive—or where some special requirement demands constant speed—a synchronous machine is justified only on account of the savings it will make. The same thing is true of a capacitor. Unless we can justify these types of equipment on a money-saving basis, we had better use the simpler induction motor arrangement and forget capacitors.

The two curves here given show a comparison between the costs of synchronous and induction motors.

Fig. 1 shows the total cost of an induction motor with its starter as compared with a unity power factor synchronous motor with a suitable exciter and control. No attempt has been made to include installation costs as these vary so widely with the type of drive. Also, it is felt that the values shown will not be far off even though installation costs are ignored because of the fact that the cost of setting up an induction motor drive does not differ very much from that of the synchronous installation.

In arriving at costs it has been assumed that a full-voltage, push-button-operated, wall-mounted control would be used for the induction motor. The same type of control has been included for the synchronous motor, except that a second wall-mounted control incorporating automatic field application has been included. In arriving at the exciter costs, a direct-connected unit has been included for the higher-speed motors and a belt-driven generator mounted on top of the motor for the slower-speed drives.

Fig. 2 has been made up in the same way as Fig. 1, except that the synchronous motors are 80% leading power factor machines. It will be noticed that the curves are not at all smooth but zig-zag up and down very decidedly. This is because when we come to a break in the rating of a control or exciter there is quite a decided jump in going to the next size. It will be noted, however, that the differences in cost do not vary a great deal for the different speeds. For instance, a 1,200-r.p.m., 300-hp. unity power factor synchronous costs $700 more than the induction, while a 600-r.p.m. motor of the same horsepower differs by $500—a difference of only $200 in increased cost.

An exception is the 1,800-r.p.m. machine. It will be noted that at all speeds its cost is considerably greater than that of the induction motor. This is because the synchronous motor at this speed requires an expensive rotor construction on account of the centrifugal forces involved.

Fig. 1

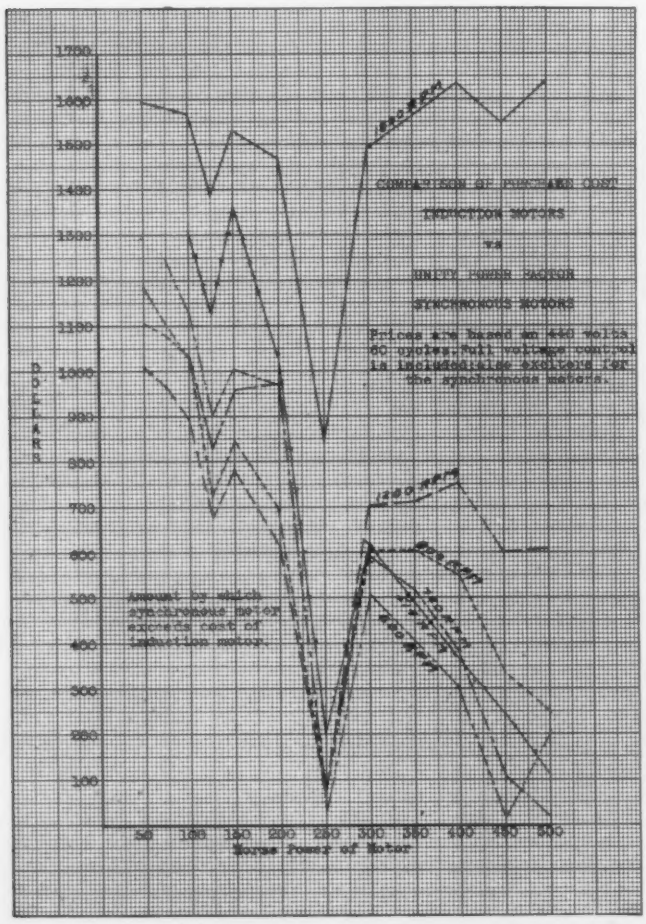
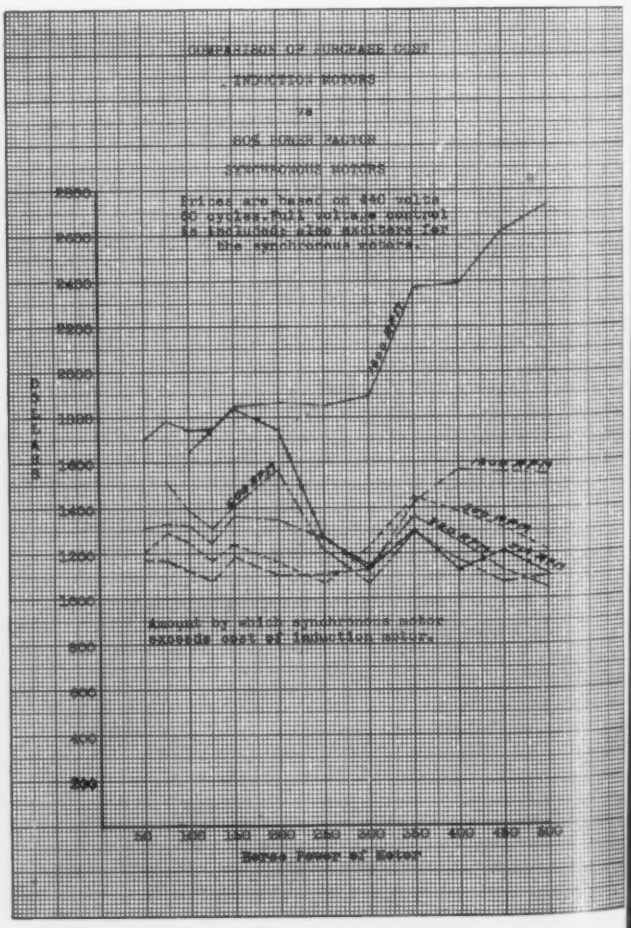
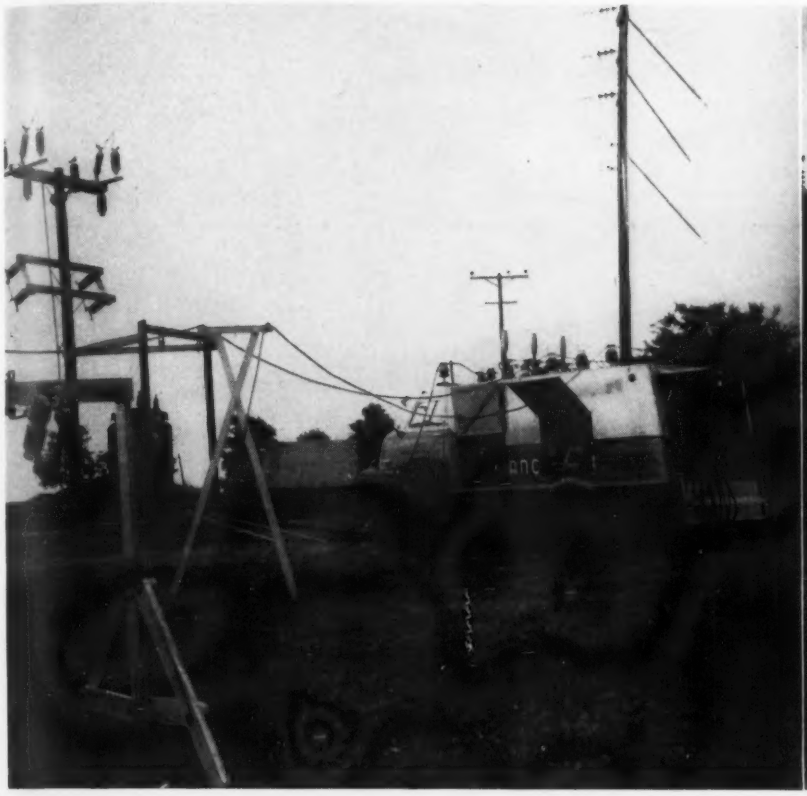
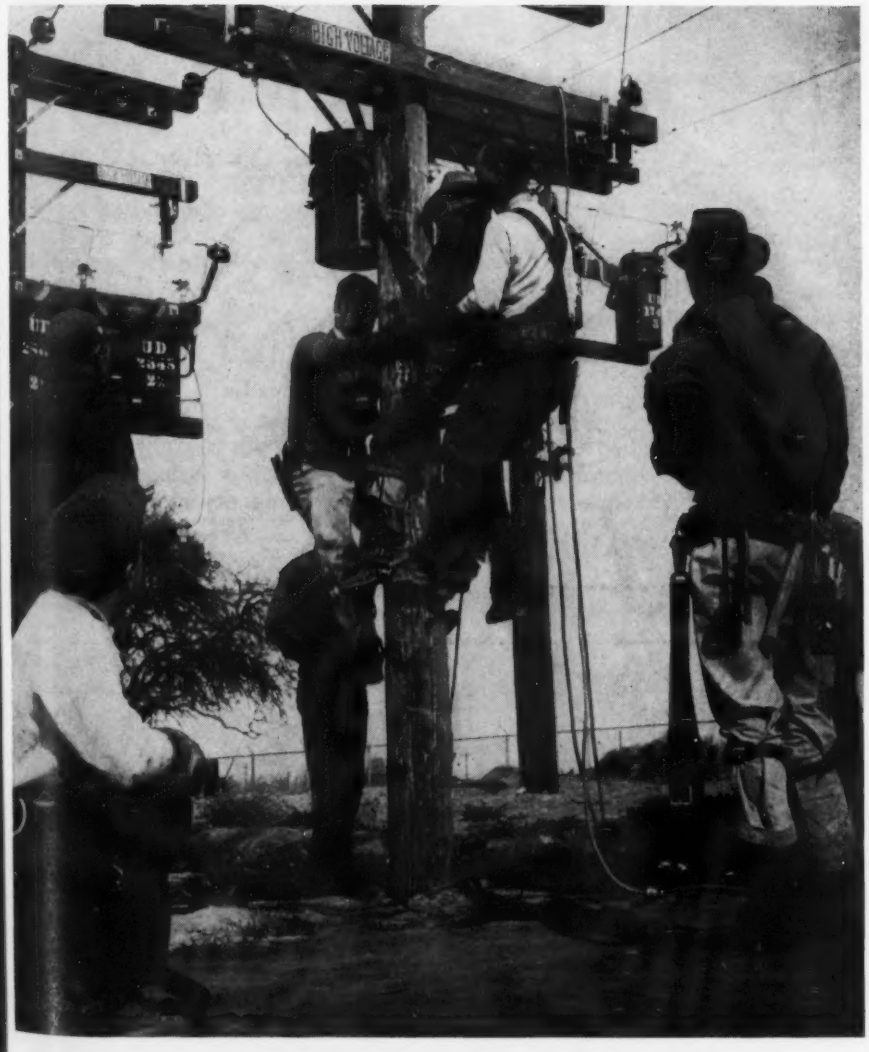


Fig. 2







Mobile Test Unit

NEW MOBILE TEST UNIT developed by the A. B. Chance Co. is equipped as a laboratory to make special power field tests on electrical switchgear. Complete laboratory is made up of two units. Truck and its equipment are designed as a control unit; trailer is the instrument unit. Power is obtained by tapping a distribution primary. Complete instrumentation includes a motion picture camera that will take pictures up to 3,000 frames per second. Laboratory enables field testing under actual operating conditions. New products can be given actual field tests. This unique test laboratory will make tour including West Coast.

Resuscitation

POLE-TOP RESUSCITATION training is given on 20-ft. experimental poles in lineman's training school operated by Sacramento Municipal Utility District. Poles are also used by district to test pole line construction standards. Six of the most important steps in pole-top resuscitation are thoroughly drilled into the men in simulated accidents. It is aim of district to train and standardize functions and actions of every crew member in electrical accidents.

Nailing Uskon conducting rubber radiant heating panel to ceiling joists (left). 3 in. of rock wool above is used to prevent heat loss upward. Completed radiant heating panel installation on living room ceiling (right). Open space will be filled in with standard building panels to complete ceiling. It is an advantage not to have heating panels cover entire ceiling because desirable air circulation is set up between warm and cool portions of ceiling

Radiant Heating with Uskon Panels

USKON conducting rubber radiant heating panel makes its West Coast debut in a new residential tract at Palo Alto, Calif. This revolutionary new idea is a development of the U. S. Rubber Co. during the past few years. It is partly an outgrowth of the rubber grounding pads developed for X-ray rooms. Lampblack is mixed with rubber in a homogenous mass to give any desired degree of conductivity, and hence wattage converted into heat.

In the panels for radiant space heating the conducting rubber sheet is backed with a sheet of 3/16-in. asbestos board and faced with 1/16-in. of phenolic insulation—then finished in paper or cloth to suit the builder. Two sizes of panels, each in two wattage ratings, are made. There is a 3x4-ft. panel and a 4x4-ft. panel. Both come rated at 220 volts, with either 17 watts or 22 watts per sq. ft. At the higher wattage density the smaller panel consumes 264 watts and the larger, 352 watts. Ratings at 17 watts per sq. ft. are 220 watts for the small panel; 272 for the large.

Panels were made in the two sizes for convenience of the builder in making installation. The two sizes and the different wattages make possible supplying the necessary wattage with convenient mechanical arrangement of panels on the ceiling joists. A 1½-in. space all around the edges of the panels where there is no conducting rubber provides space for nailing. If by any chance it is necessary to nail through the conducting rubber, there are provided insulating nails for the purpose. Circuit connection to the conducting rubber is made by metal straps at two sides of the rubber with terminal studs located in a standard 4x4 outlet box. Leads are brought out by the electrician through a knockout to the 220-volt circuit and a cover plate placed on the box.

Type of house in Coastwise Construction Co.'s Palo Alto tract, where Uskon radiant heating panels are being installed for electric space heating

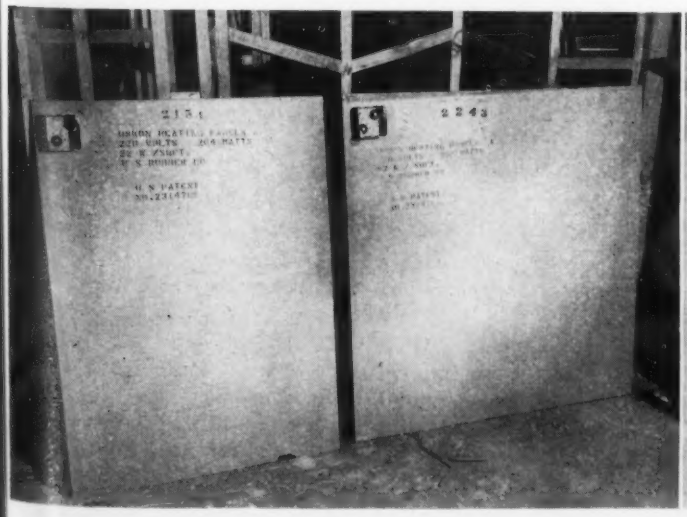
Electrician makes attic connections to heating panels. Outlet boxes shown, containing terminal studs, come as part of each factory-equipped panel

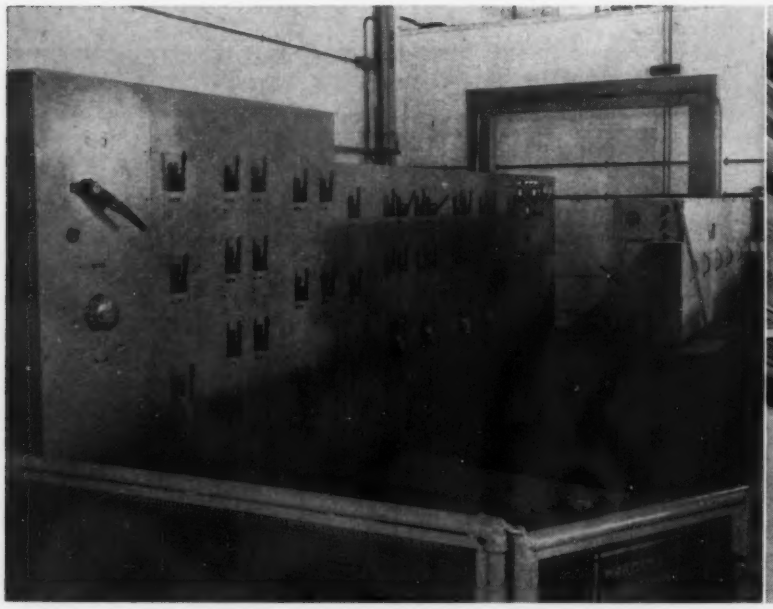
The accompanying staff photographs show the installation in the new Palo Alto house. After wattage has been calculated for a room the most convenient panel size and panel wattage is chosen. Panels are then nailed to the underside of ceiling joists as shown. Panels are placed around the periphery of the room working toward the center. After the proper number of panels has been installed, if there is any vacant space left in the center of the room, as there usually is, this space is filled in with standard building panels. From here on, the cracks where panels join are taped and the ceiling finished in conventional manner.

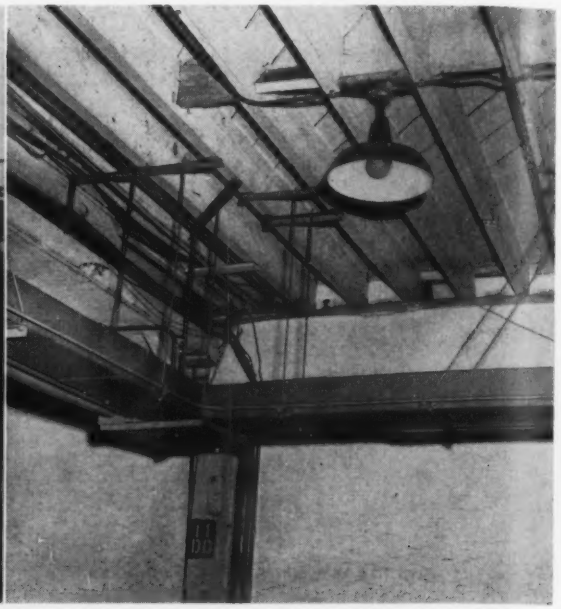
To prevent heat loss above the ceiling, 3 in. of rock wool or other standard insulating material is used. In other respects the house is built for low heat loss, as must all houses be constructed for any system of electric space heating. Each room is individually thermostatically controlled to provide high inherent diversity in each installation. Special controls or demand limiters may be used if desired.

Coastwise Construction Co., builder of the Palo Alto tract, has used several types of concrete floor panel heating in homes it has built. In going to the new Uskon ceiling radiant heating, Ed. Cornblum expects to obviate the troubles experienced with floor installations. Claimed advantages by him and the manufacturer are simple, easy, low-labor cost installation, quick heat response as against the time lag of floor heating, and a future trouble-free installation. First cost of Uskon radiant heating is about comparable with other types of successful panel heating. Operating cost to the consumer is expected to be less. Charles Sanders, foreman for Malm & Welter Electric Co. of San Francisco, doing the work for Coastwise, expressed enthusiasm, too, over the ease with which installations of the new panels can be made.

Two standard sizes of panel are set up for photographing (left). Panel on left is 3x4 ft.; at right is the 4x4-ft. panel. Both are of the 22-watt rating, but come rated 17 watts per sq. ft. also. Dining room (right) had only one vacant square after specified number of heating panels to give desired wattage had been installed. Space will be covered with standard building board. This room took eight 4x4-ft., 352-watt panels, making total wattage 2,816

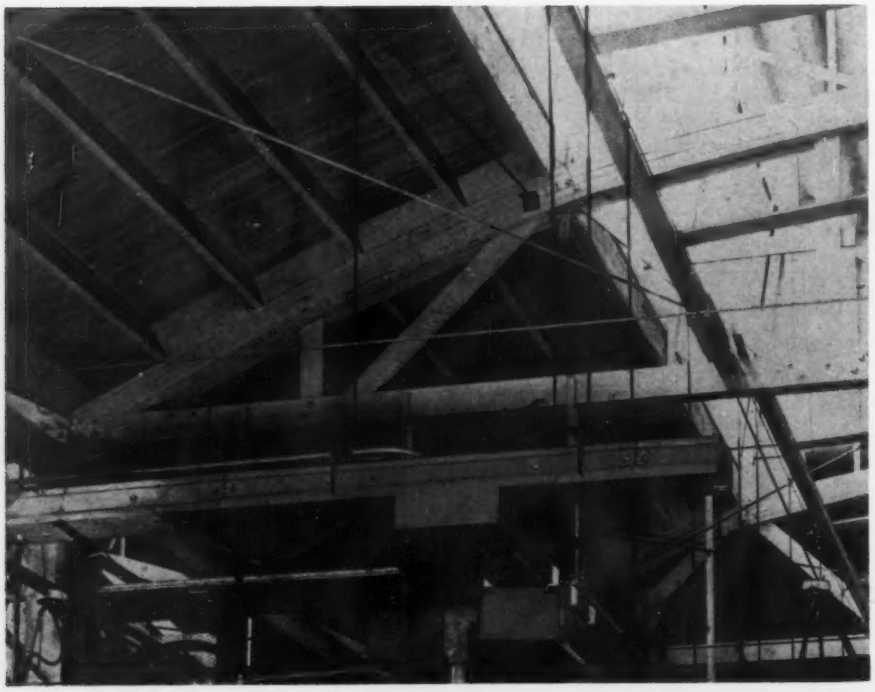






Main switchboard (left) for plant 2 is fed by BussWa from transformer vault under the floor of an adjoining room. Left section is for single-phase lighting fed by a 1,000-amp. BussWa. Right section is for 220-volt power. This is fed by a 2,000-amp. BussWa. At extreme right is shown bank of six 45-kva. capacitors for power factor correction. Each is controlled by a 200-amp. safety switch. Contactors installed behind the capacitors are time-clock controlled to disconnect capacitors automatically on Saturday and Sunday. At right is shown a portion of feeder A. Note the specially designed rod-type hangers. In the corner in the elbow, a piece of gutter is run at the left side. This was to make a 90° turn for the conduits without using a radius elbow. In all cases conduits are run on the same hanger which supports the bus. Half-inch conduit runs back to the main switchboard on hangers for the capacitor control wiring

ALL BUS DUCT FOR FOOD MACHINERY



ANOTHER well-engineered job and a fine example of the general use of bus duct in industrial wiring is to be found in the new plant of the Food Machinery Corp. at Riverside, Calif. Here, the entire power wiring system has been installed with bus duct to provide flexibility in locating and relocating machines and as insurance against need for future extensive rewiring as changes take place over a period of years. Extensive use of capacitors for power factor correction, also is to be found here.

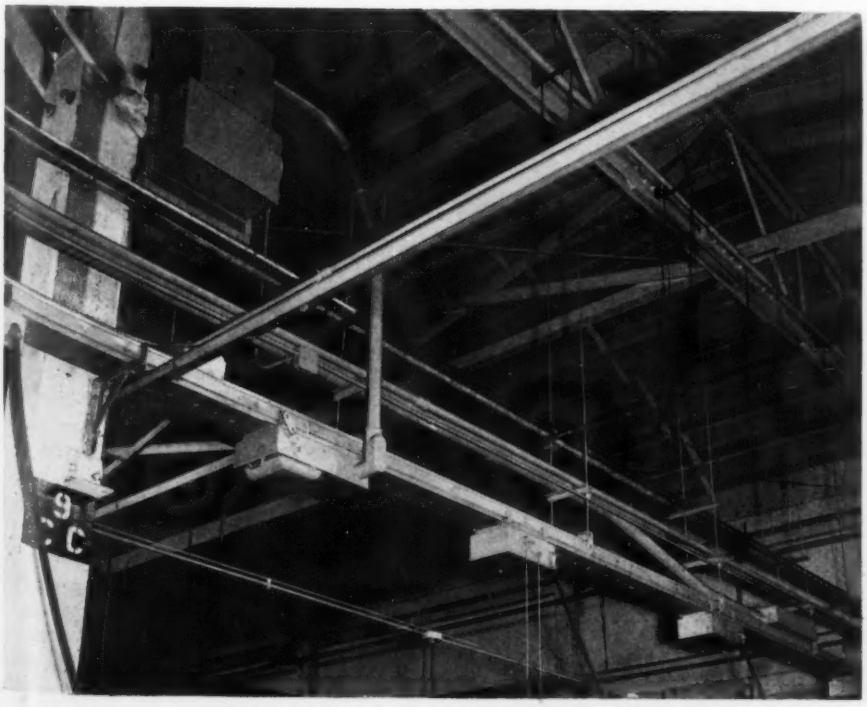
Feeder C, consisting of a 440-ft. run of 600-amp. Flex-A-Power is here shown. Note especially the Tee connection in center of picture. This was stubbed out and left for feeder run which can easily be installed and connected at this point. The circuit breaker plug shown tapping Flex-A-Power in center of picture feeds 25-hp. motor

Getaway from main switchboard (left) in plant 2 showing how BussWa, Flex-A-Power and conduit runs leave the switchboard. Lettering system is used to tie in bus to breaker. A is a 2,000-amp. bus duct run 330 ft. long. Feeders B, C, and D are Flex-A-Power runs. At end of the 330-ft. BussWa run are installed three 45-kva. capacitors and one 30-kva. capacitor. Feeder B is 600 amp., 440-ft. long and has two 45-kva. capacitors at the end. Feeder C is same as B. Feeder D is 600 amp., 740-ft. long and has four 45-kva. and one 30-kva. capacitor installed throughout its length. Note novel arrangement of hangers which support the 2,000-amp. BussWa and various conduits as well. At right is shown the termination of feeder A in a 2,000-amp. BussWa with two 45-kva. capacitors at the end. At lower left in view is shown a 600-amp. switch which is the main for a feeder to separate building housing air compressors

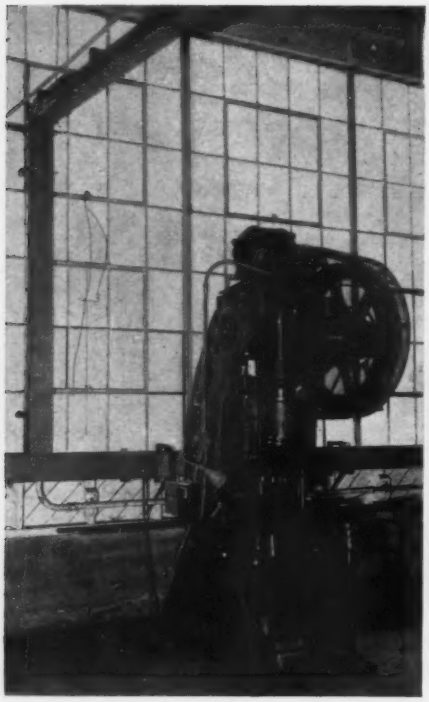
PLANT

The manufacturer makes a complete line of equipment to handle, pack and ship citrus fruits, One important product is a machine called "Flavor Seal." This machine puts a sort of waxlike coating on oranges to preserve them. The machine shop contains the latest machinery and the whole plant is a model of order and cleanliness. Electrically, it has no equal in the area.

The present electrical installation, shown by the accompanying photographs, was installed as part of the company's reconversion program. During the war they manufactured a complete seagoing tank. There are two separate plants with no electrical connection between them, each having its own transformer vault under the building. Installation and layout were under the supervision of A. A. Leithold, superintendent of general maintenance for Food Machinery Corp. Trumbull furnished all of the switchboards, bus runs, Flex-A-Power and trolley runs, as well as miscellaneous safety switches, starters, etc. The installation has provided Food Machery with such a flexible layout that almost any conceivable change within the plant can easily and quickly be made with no waste of feeder capacity. Photographs and caption material bring out important features of the installation. Additional pictures on next page.



Flex-A-Power used as a 250-amp. 3-pole welder bus. Capacitors are installed at top of the BussWa. Note the pull box on top of bus in lower right corner. At this point within the enclosure the Flex-A-Power bus bars are split, making two separate runs with two separate feeds. Circuit breaker plugs are shown with cables to welders



Part of run of feeder B. Note Tee connection which permits horizontal run of bus duct along the wall to serve numerous machines. The small box shown on the punch press immediately to the left of the starter is another item designed especially for the job. This box contains a small 75-volt-amp. Jeffries transformer, 220/110 volts. A 15-amp. 2-pole circuit breaker can be installed in the box. This enables 110-volt lighting service to be taken through this unit from the 220-volt power feeder installed for the machine operation

Run of Trolley Closur (metal protection for crane and hoist trolleys) 125 ft. long in experimental building. Various experimental equipment is lifted and carried around the 180° turn in a sort of production line process. Three one-ton Yale hoists are employed, operating on 110 volts. Monorail was built to conform to Trolley Closur radius bends

Shown here is feeder D, a 600-amp. Flex-A-Power run. One part of this installation was Designer Leithold's own idea that solved an ever-present problem. Note power conduits from Flex-A-Power plugs with 90° turn down to machine. Lighting conduit is run perpendicular to this and terminated in an outlet box on top of power conduit. This cross lighting conduit provided an excellent means of stopping side sway of power conduits. The two systems each help support one another. Spare welder Flex-A-Power plugs are scattered at intervals through bus runs in the building. Portable welders are wheeled into place; plugged into duct

An Automatic Demand Regulator

Cuts Space Heating Voltage to Half — Reduces Wattages 75%

Automatic load regulator installed in San Francisco residence to save wiring cost. Regulator permitted use of 100-amp. service, whereas a 200-amp. service would otherwise have been required for a connected load of 30 kw.

LOW electric rates in the West have brought about such a diversity of uses in the home, including space heating, that utilities find themselves confronted with problems of high demand, poor diversity and low load factor on some of the loads that have been imposed upon them. In the eyes of the utilities, space heating seems to be the worst offender as regards poor load characteristics. There are those in the industry who feel that some utilities have singled out space heating and are making it too difficult for those who want to use it and for those who want to sell equipment. Utilities counter with the most tenable argument that they simply cannot encourage electric house-heating installations with a diversified demand of some 6 kw. coincident with system peak. They say that present rates of six to eight or nine mills per kilowatt hour are entirely too low and are not compensatory for this class of service. Utilities object also to space heating while the power supply problem is so critical.

This situation has given rise to many schemes and proposals for a way out for the customer and the purveyors of equipment. Most solutions to this problem have been directed at some type of heating system or of load control which would improve load characteristics and make space heating more acceptable to the utilities. Load control or peak-limiting devices have appeared from time to time. Recently a new automatic load regulator has been made available by the Wesix Electric Heater Co. that is of more than passing interest. It functions automatically to limit demand of a residential service to a predetermined value in a different manner than most predecessor devices.

Essentially it is a 100-amp. ammeter element with adjustable contacts that close or open the circuit to a small motor which actuates a double-pole double-throw switch. Operation of this switch changes the voltage on the space heating load from 240 volts to 120 volts, thereby reducing wattage consumed by the space heating load to ¼ normal, since wattage varies as the square of the voltage. The load regulator is connected into the house wiring as shown by the accompanying diagram. From this it will be seen that all other loads in the house — range, water heating, lights and appliances—are always on normal voltage, but when these loads (as metered by the regulator) exceed a predetermined demand, then the space heating load is automatically cut over to 120 volts with a 75% reduction in wattage. As soon as demand on range and other uses drops 500 watts below the set demand value, the space heating load is cut back automatically to 240 volts and normal wattage for whatever portion of it that is thermostatically cut in. To avoid bad unbalance between the two sides of the three-wire circuit, when space heating is cut over to 120 volts, the space heating load is so wired as to give approximate balance.

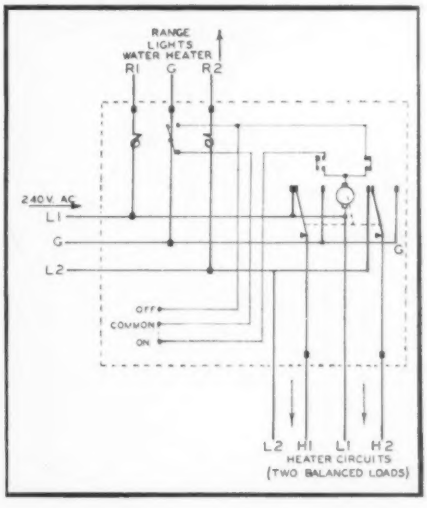
Mechanism of automatic load regulator. Heavy-duty ammeter element is shown on upper portion of panel. At the bottom is shown the small motor that actuates the double-pole, double-throw switch. Utility can seal cabinet

With a load limiter of this type, it is apparent that the device could be used to limit demand on service wires and service entrance equipment. For instance, load could be limited to 100 amp. on service entrance equipment regardless of connected load on the premises.

One of the first applications of the automatic load regulator was made in a residence in San Francisco. This installation was made for the sole purpose of limiting demand on a connected load of some 30 kw., so that a 100-amp. service entrance could be used. Otherwise, a 200-amp. service would have been required, obviously greatly increasing wiring cost. One of the accompanying photographs shows the load regulator in relation to the 100-amp. service entrance switch.

Special provision has been made for sealing by the power company to insure against tampering with load settings. A device of this type should have so many customer advantages that it logically would be installed by the customer and not the power company.

Wiring for automatic load regulator



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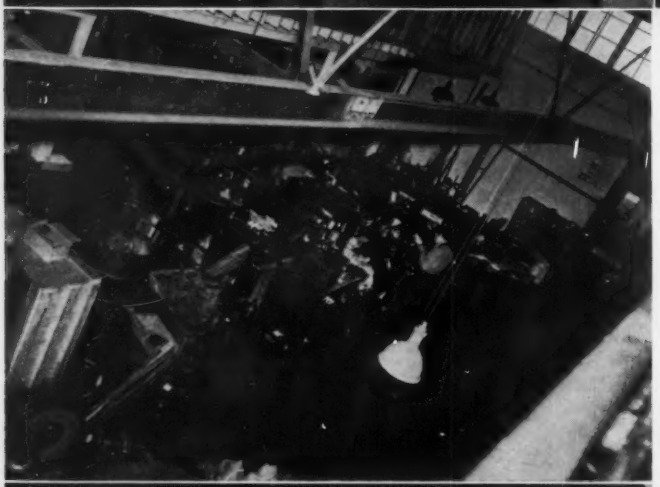

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—everything from

Just how *complete* is *complete electric service* as advertised by many contractor-dealers? And what does it take to make it *complete?* Although generally thought of as an industrial electric service shop, California Electric Works, San Diego, is really set up for complete electric service and sales and installation, from residences to factories or ships or business buildings or public buildings or anything. This unique partnership of ten men started with three in 1920 and has been growing in every way since. Although it never seems to be through making changes and improvements, a good sign of a dynamic business, the pictures here illustrate what it takes to give that *complete* service from a compact floor area. (1) First is skilled supervision. Each of the partners, after proved experience, handles one phase of the business. Altogether, left to right, front row: Norman Ferguson, construction; V. R. Knight, general manager; E. J. Rickerson, office manager; Jack Knight, marine dept.; Frank Sloan, shop superintendent; H. O. Andrews, engineering; rear row: John Lough, plant maintenance; George Coombs, assistant shop superintendent; Dick Jamison, merchandise and supplies; and Fred Schaaf. Motorium (repair service to the trade). (2) The latter has its own service counter where hot coffee (even soup perhaps) awaits the repair customer who has to wait a minute. Cards of all dealer customers are on a board.

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Soup to Nuts and Bolts

(3) The repair shop section as seen from the balcony. Monorail hoists connect all repair departments. (4) Motor windings are burned free in separate compartment at left; cleaning, stripping and carbon cutting done here. (5) Part of the balcony coil winding department; trolley duct makes lighting adjustable. (6) Welding, brazing and buffing department. (7) Rear street entrance for Calewo trucks, with loading and receiving docks. Fine climate permits outdoor conduit and cable storage from racks at rear. Oil and solvent supplies also kept out here. (8) Wiring supply stockroom, either for company's own construction or for sale to industrial and commercial customers. (9) Nerve center of the shop, Coombs' shop office and shop stock room both adjacent to the repair shop itself. (10) The merchandise department, with an appliance showroom off left (not shown), fixtures, belts, motors, and lamps, etc. Motor parts counter at rear, also shown below. (12) This department is adjacent the office and fronts on Eighth St. For residential service the company offers a "package plan" of complete wiring and appliances for a home, all on one contract. (11) In the machine shop is metal spray equipment to build up worn shafts, and full machine tool equipment. Even the bus duct supply to machines neatly mounted on walls is used to sell industrial wiring, as well as to demonstrate a modern method of electrical distribution.

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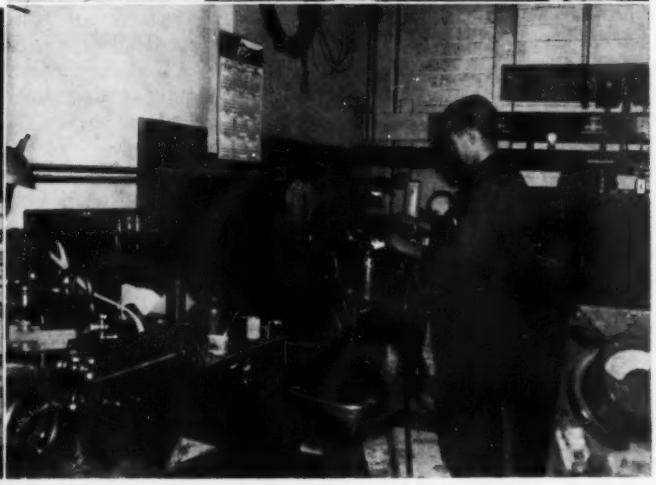
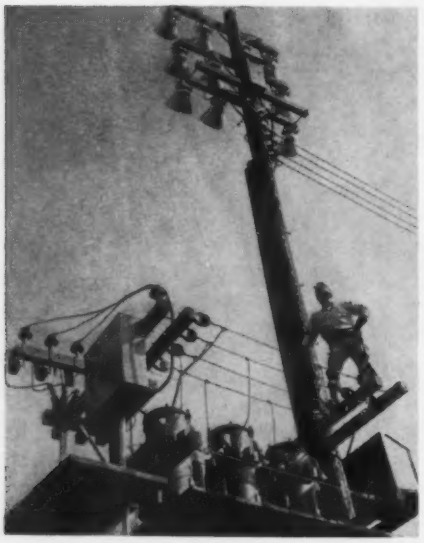


Mt. Diablo Union High School football field, Concord. 96 medium-beam floods were mounted on 80-ft. steel poles

Piedmont High team practices on newly floodlighted field. Photo was taken at 1/25th second at f/11 without flash

Football Lighting Goes for Touchdown



Three 75-kva. platform mounted transformers feed sports field floodlighting

Erecting 80-ft. wood pole for floodlights at the Sutter Creek High School

Eighteen northern California installations of new-type floodlights for sports field lighting used 1,566, 1,500-watt lights. Connected load was 2,359 kw.—Cost, approximately $275,000

FLOODLIGHTING of football and sports fields has gone over for a "touchdown" in a big way in northern California with installations having been made at 15 fields during 1948. Three others were lighted in the spring of 1947 to make a total of 18. Ten of these were for high schools. A nineteenth job, Burlingame High, has just been sold and will be installed next year. The 18 installations used 1,566 of the new-type 1,500-watt, L-69 General Electric floodlights. Most of these were of the A53G7, or medium-beam, type. Total load is 2,359 kw. Approximately $275,000 was spent on the 18 installations.

This remarkable record of floodlighting installations came about as a result of great interest in football and other sports, institution of night contests between schools, public interest in juvenile welfare, and an intensive selling job by the industry with the General Electric Co. and the General Electric Supply Corp. carrying the ball. Several methods of financing were used. Some jobs were financed by school boards, some by student bodies, several by public subscription, one largely by a philanthropic citizen and one by an electrical contractor who will be repaid by the student body of the school.

All installations were engineered jobs. Number of lights varied depending upon size and importance of the field and to some extent upon funds available. Type and number of supports for floodlights likewise varied. Practically all poles are 80-ft. high—some are wood and some are steel.

Pertinent information on each installation is contained in the following list. The accompanying photographs show several of the jobs.

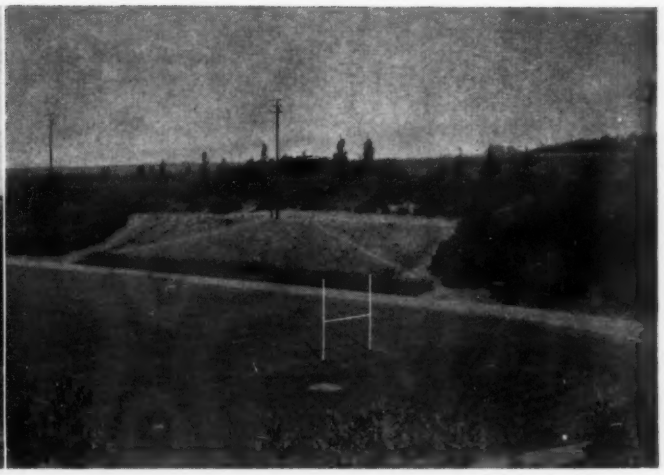
New Floodlighting Jobs

Piedmont High School—144 lights on six 80-ft. steel poles. Contractor, Abbett Electric, Oakland. Engineer, Romaine Myers of Oakland. Job due to efforts of Dean Witter, who donated more than one-third of the cost in memory of son lost in late war. Balance raised by student body.

El Cerrito High School—96 lights on six Hawley steel poles. Contractor, Timmons & Berk. Job was solely due to efforts of Joe Martin Turner, Justice of the Peace in El Cerrito. Money raised by public subscription in interest of juvenile recreation.

Alhambra Union High School, Martinez—160 lights on ten steel poles. Engineer, Romaine Myers of Oakland. Contractor, Leonardi Electric Co., San

El Cerrito High is ready for night football with its newly lighted field. Money was raised by public subscription



San Francisco State College football field lighted with 72 floodlights mounted on wood poles on surrounding bank

Rafael. Combination baseball and football field.

Mt. Diablo Union High School—96 lights on six Hawley 80-ft. steel poles. Contractor, Concord Electric Co., Concord. Engineers, Clyde Bentley and E. L. Duvander.

Rio Vista High School—80 lights on eight 80-ft. wood poles. Contractor, Stanley Pearce Electric, Vallejo. Only summer and fall recreation field in whole farming community.

St. Helena High School—128 lights on wood poles. Combination baseball, football and softball field. Contractor, Electric Appliance Service, St. Helena. Judge L. G. Vasconi headed a citizens committee that was responsible for the project.

Petaluma High School—96 lights on wood poles. A sports field. Contractor, Frank B. Maus, Petaluma. School board fostered and paid for the lighting.

Doyle Park, Santa Rosa—160 lights on eight steel poles. Baseball field. Norman Russell electrical contractor. Job due to efforts of Ed Baum, city manager, in getting farm club from major leagues for city.

Sutter Creek High School—124 lights on eight 80-ft. wood poles. Contractor, Amador Electric, Sutter Creek. Combines football, baseball and softball. Interesting point about this job is that a community of about 800 persons raised around $15,000 by subscription to provide juvenile recreation. The movement was started by the Sutter Creek Lions Club. Non-interest-bearing bonds in denominations of $5 to $25 were sold to the public to be redeemed by chance drawing whenever money became available from the receipts of the games and entertainments held on the field. The agreement provided that 25% of gross receipts were to be used to pay off the bonds. Over-all cost of the field was a little less than $14,000. About $10,000 was raised by the sale of bonds and out-right gifts. Approximately $3,000 was contributed by the school district. The Lions Club purchased all lighting fixtures, wiring, switches, poles, etc., and the high school district made the installation.

San Francisco State College—72 lights on six 80-ft. poles. Contractor, Buzzell Electric Co., who sub-contracted to Petersen Engineering Co. Buzzell Electric financed installation; will be repaid by student body.

Washington Park, Santa Clara—120 lights on Union Metal steel poles. Contractor, University Electric Co. of Santa Clara. City clerk and mayor pushed the installation.

Hawes Park, Redwood City—36 lights for softball field. Installation by Redwood City Fire Department.

Backesto Park, San Jose—36 lights for softball field. City Electrical Department made installation.

North Beach Playground, San Francisco—108 lights for sports field. H. S. Tittle, electrical contractor.

Mosswood Park, Oakland—30 lights. Abbett Electric Co.

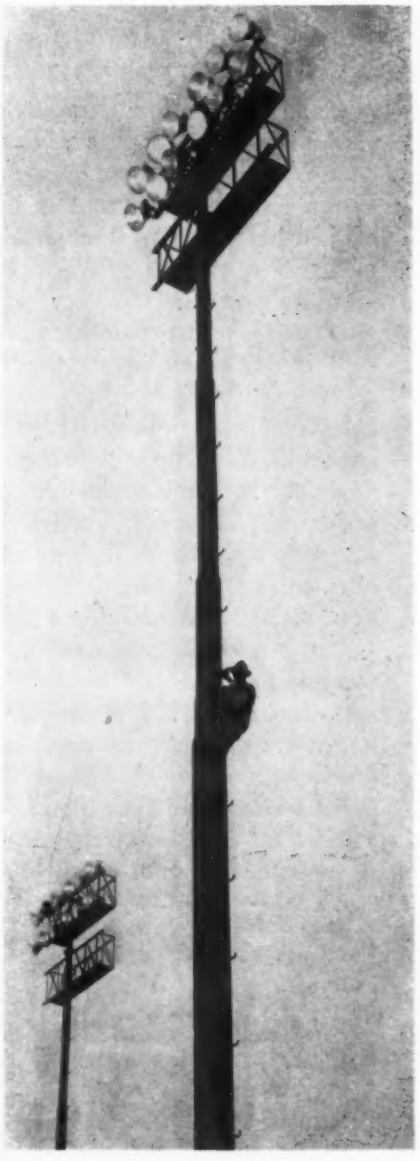
Arroyo Viejo, Oakland—30 lights. Scott-Buttner, electrical contractor.

Lincoln Park, Oakland—30 lights, Conrad Electric Co.

Italian Amusement Park, Fresno—100 lights.

Burlingame High School—108 lights on six 80-ft. Union Metal poles. Contractor, Petersen Engineering Co., San Francisco. Engineer, G. M. Richards & Associates. Job resulted from a demand by citizens for recreational facilities for townspeople. Order has been placed and installation will be made before next season.

Tapered steel poles 80 ft. high were used on many of new floodlighting jobs



ELECTRICAL WEST

"AW" Gets a New Boost

WE like the new approach to the adequate wiring problem that has just been announced by NEMA. A complete sales program has been developed to sell "AW" to the people of the industry themselves. Inspired by the success obtained by a few manufacturers and wholesalers, the National Adequate Wiring Bureau has built a self-interest story directed to employees of NEMA members, to wholesalers' employees, and to dealers.

This approach has in it some of the potency that should give "AW" a terrific boost in popularity. The industry doesn't need a psychologist to tell it that the self-interest appeal is a quick and direct way to build sales. If the people of the industry believe the story, and take the prescription themselves, then the public can be sold with greater ease. NEMA President W. C. Johnson summed up the arguments in his letter announcing the campaign: "All of us, individually and collectively, are dependent upon the electrical manufacturing industry's prosperity. If this industry prospers, your company and my company prosper. And if our companies prosper, everyone connected with them benefits — executives, engineers, salesmen, clerical help, and workers in the plant. It naturally follows, therefore, that anything which contributes to the industry's prosperity affects each individual's job and job security. Thus, it is to each individual's advantage to help the industry in its efforts to develop new markets for electrical products."

Up to now the program has only one shortcoming that we can see. Why confine it to manufacturers, wholesalers and dealers? Enlist power company employees and contractors and their wiremen. (And the people who produce the industry's magazines, too.) That could total a million people. Some sales force, if each believed and told the "AW" story!

Golden Calf

TELEVISION suffers from the glamor and inflation of its predecessor — radio. Even before it is a calf able to stand on its wobbly legs, it is beset by hungry and greedy hordes who want to milk it of gold as though it already were a huge animal. Everybody wants exorbitant fees for anything done for it before the new industry has even started. Give the poor infant a chance to grow up! Everyone must put some *investment* in it before it can pay anyone.

Educating Better Engineers

FREQUENTLY we wonder about the impulses that actuated engineers to select that particular profession for a career. The question poses itself most often when we see engineering graduates who have been successful in fields far removed from their profession. Or when we observe the minority who, despite their training, have never progressed beyond the drafting board or a minor operating responsibility.

In each instance the individuals made a bad choice in selecting engineering as a career. The choice may not have been their own—a parental fancy may have forced them into engineering. Or they may have been given poor advice in high school. Or they may have been seeking glamor and romance under the delusion that engineering offered them.

Today such mistakes need not be made. In a metropolitan high school recently we saw a poster prepared by the Engineering Council for professional development. In outlining engineering as a career, it gave some facts to be weighed before finally selecting that profession. Many mature engineers would have valued the suggestions two score or more years ago. Many others who studied engineering would have been saved time and money had they been given the same advice then. Here are the qualities that the poster lists as necessary for success in engineering pursuits:

A genuine interest in the things engineers do.
An abiding honesty in thought and action.
An unfailing desire to know the truth.
The ability to weigh ideas and decide wisely.
The capacity to think logically.
The ability to visualize constructively.
The skill to obtain ingenious results.
A willingness to work hard throughout life.
The ability to cooperate with others.
The capacity to assume leadership.
The hardihood to persist and endure.

A little constructive self-analysis with a list

EDITORIAL VIEWS

such as this might have saved a lot of unwise decisions by uninformed youths in years gone by. Use of it today in high schools means that there will be better engineers in the future.

Questionable Arbitration

FOR many years the electrical contracting industry has had its own court of final appeal, the Council for Industrial Relations for the Electrical Contracting Industry. It was originated with high purpose, and for many years seemed to have been operated with sincerity. But its fundamental unsoundness seems to have festered through the purpose lately and made the integrity of the council subject to question.

Since the body was made up of an equal number of representatives from the NECA and the IBEW, the theory was that this would balance judgment and result in decisions in labor disputes that weighed the interests of each, contractor and union. But evidently the unsound aspect, little thought of on surface observation, is that each of the contractor members of the council is an employer of IBEW men and, in this kind of a labor scarcity, is beholden to the good graces of union leadership for this important factor in his own personal business. Add to that the lack of judicial restraint on the part of a member of the union group in failing to disqualify himself from sitting in judgment on a case in which he was involved as a negotiator, and the council degenerates into a prejudiced or biased body. That is not arbitration.

At an NECA convention in Los Angeles in 1938, the author of the council plan gave a fine address on the altruistic theory upon which it was based, and claimed for the council a long record of peaceful and fair arbitrations of disputes in their last-resort stage. But recently several disputes from the West reaching that council, presumably for a fair trial on merits, came out with decisions that make it appear the council did not listen to the evidence at all but decided the cases on politics of its own or appeasement to the union.

If the industry is to regain any respect for this so-called arbitration tribunal, it must be rebuilt upon a basis that permits of true impartiality and judicial integrity. Its recent record is a disappointment to even its former staunchest supporters.

SOME wag once said that, if we should suddenly do away with all of the advertising in the United States, our civilization would immediately collapse. This statement contains more truth than is first apparent. There are those who refuse to see the importance of advertising in the economic life of the nation. Moreover, there are those who have singled out this phase of trade and industry for strong criticism. Civilization today would collapse if it were not bolstered up by American advertising. Today the rest of the world depends upon American production. Yet, too few people recognize that this nation's great productive capacity could not have been built without advertising. Again, there are too few who see advertising as the bulwark of American economic freedom. Advertising is the golden key that has unlocked the door of plenty for us all. Selling and distribution simply could not do the job without advertising. Advertising not only sells goods, it always helps measurably to lower prices and increase quality. When electric refrigerators were first sold, only a few thousand were made, and it took $600 or more to buy one. But during fifteen years of advertising millions were sold, the price came down to a fourth of the original price, and the quality was improved greatly. . . . It is high time we wake up to the economic facts-of-life. Good and wise advertising is a part of free competitive enterprise. Naturally advertising would be unnecessary in a dictatorship. The dictator simply could tell the people what to eat, wear and enjoy. He would also tell them what they should not have. Under a system that permits no advertising we would have two choices: a lower standard of living or a dictatorship. — George S. Benson, president, Harding College.

Karsten

Jewell Holloway

IT'S EVERYBODY'S BUSINESS

EVERYBODY is affected by how the wholesaler handles his business. Dealers, contractors on one side, manufacturers on the other, are served through the wholesaler. Therefore what wholesalers talk about at their conventions is everybody's business. And at the Pacific Zone convention of National Electrical Wholesalers Assn., Hotel del Coronado, Calif., Oct. 4-6, the wholesalers of the West broke away from past formal meeting style to devote two general sessions to panel discussions.

What they talked about included servicing television, home freezer promotion, specialty salesmen to help dealers with appliance sales, rural market possibilities, materials handling, simplification of stocks, training of personnel to get along together and the place of wholesalers in industry cooperation groups.

These panel discussions were supplemented by introductory talks by A. E. Holloway, vice-president of the San Diego Gas & Electric Co., on "Dealer-Distributor Cooperation," and by M. G. Sanders, formerly of Central Arizona Light & Power, on "Industry Cooperation."

"Each member of the electrical industry must realize fully its own responsibility in any type of cooperative promotion plan," said Holloway in an introduction to a description of the Bureau of Radio & Electrical Appliances of San Diego County, its basis for organization and the result it had secured as an all-industry association. No industry promotion can be carried out successfully at any one level, he said. It requires national advertising by the manufacturers, regional advertising and promotion by the distributors, and local effort by the dealers with store and salesmen tie-in effort. The utilities can best serve as regional coordinators of such industry promotions, he felt.

Cooperation within the industry and within individual companies is essential to the continued leadership of the electrical industry, according to Milton G. Sanders in his talk at the opening of the second general session for NEWA members and guests. Sanders, who recently resigned from his utility post to join the Bob Dale Institute, put his emphasis on the development of individuals in the industry as a means of strengthening each company, the industry as a whole, and the nation as well. "Industry management has the responsibility of taking over the job of training its people to get along with each other and to develop the individual employee's personality as well as his skills," he said. Sanders, former PCEA president, included his famous "Eve didn't buy a red apple" story in his talk.

Simplifying Wholesalers' Lines

From the introduction by C. W. Goodwin, G-E Supply, San Francisco, and the results of the floor discussion, wholesalers and their suppliers must seek to simplify the number and types of lines of products carried. Particularly in inventory of goods which show a slow turnover, said Goodwin, who served as discussion leader in place of A. H. Meyer, Leo J. Meyberg Co., unable to attend the convention.

Drawing on his experience and practices at G-E Supply, Goodwin outlined a practical approach to the inventory problem by offering three classifications for goods: (1) the active, which showed a 90-day or less turnover; (2) inactive, those goods which have regular movement throughout the year but no replenishment; (3) unauthorized, those goods which have not shown a profitable turnover, or which do not come under the type that are necessary items in spite of turnover, which may be old models or out-of-date design, and which should not be reordered. The wholesalers are warranted, according to the discussion, in dumping supplies which come in this third classification. However, the floor discussion brought a question from E. A. Phillips of Phillips & Edwards, San Francisco, who asked if it were possible to effect an exchange of lists of unwanted or overstocks between various wholesaling concerns. Such an exchange is being done elsewhere in the country through the eastern headquarters of NEWA. The idea received favorable comment.

and NEWA decided to look further into this idea through its secretary, R. A. Balzari.

Servicing Television

In a panel discussion on *How Can Television Sets Be Properly Serviced to Develop This Type of Business on the Pacific Coast?* wholesale distributors from outside the Los Angeles metropolitan area received a cruel but necessary briefing on some of the major problems that would face them and their dealers when television reached their areas. Led by Walter Stickel, RCA television sales manager for the Leo J. Meyberg Co., Los Angeles, the serious problem of television servicing was analysed from all angles other than technical. "Television is an exact science," said Stickel, "and proper service will be absolutely necessary for the full development of the industry." He pointed out that there were three ways in which TV servicing could be handled: by the manufacturer; by a servicing contractor arranged through manufacturer, distributor or dealer; or by the retailers own service organization. All three types of servicing are practiced in the Los Angeles area, with varying degrees of success.

Each type of servicing has its advantages, Stickel pointed out. The manufacturers have the financial backing to set up adequate service facilities and the chance to set national standards of installation and service consistent with the factory knowledge of their own receivers. Servicing contractors, handling all makes of receivers for all dealers, have the advantage of being able to work servicemen full time, of being able to hire technical help, and to afford the large outlay for equipment. The dealer who can do a satisfactory job of TV servicing has the advantage of personal contact with the set owner, of considering service as a builder of good will and future sales of other electrical appliances.

Stickel reported that, on an average, television in Los Angeles required *six service calls per receiver per year.*

It was brought out in his talk and in the discussion that it requires between $5,000 and $7,500 to set up a television repair shop, and that this initial investment in facilities and equipment is a major handicap in any effort on the part of distributors to get their dealers to handle TV servicing. Added to that cost was the necessity of having repairmen with at least one full year of specialized training.

Wholesaling Home Freezers

The importance of the wholesale distributor in the promotion and market development of a new appliance was covered by Harry Shayne, vice-president of Gough Industries, Los Angeles, in a short talk and a panel discussion designed to stimulate the sale of home freezers through wholesale channels. Shayne put his complete emphasis on the necessity of having every wholesaler and wholesaler's salesman own and use a home freezer in his home. Only in that way can he learn how to sell them through the telling of a sincere story to his dealers. And, to follow out this idea, every wholesaler's salesman must sell his dealers and dealers' salesmen on the idea of using a freezer in their homes so that they, too, can tell a sincere and factual story of an idea of living that is completely new, both to the industry and to the public. Until each and every one of the freezer's sales points proves itself in the salesman's own experience —and it will very quickly—he is not going to get the full profits that are available in this rapidly developing market.

One of the reasons for selecting Shayne to lead the discussion on freezers was his outstanding record in the promotion of Philco freezers in the southern California market. Part of his talk to the wholesalers included description and illustration of his distributor's freezer promotion campaign which produced more than $2,000,000 in freezer sales for Gough Industries. He showed the method of correlating a program that included store cards, streamers, window banners, cooperative advertising, food discount plans, etc.

Manuel Gerster Curtiss Todt Balzari

Using Specialty Salesmen

That there are certain conditions under which it is advisable for the wholesaler to employ specialty salesmen was brought out in a talk by J. J. Moffatt, Westinghouse Electric Corp., and in the discussion session which he led. Those wholesalers handling major appliances, it was brought out, face conditions today that require the specialized talents of salesmen who can concentrate on the appliance selling problems at retail level. The great need for long-range guidance of dealers toward more effective display, promotions, advertising, inventory control, on-the-floor and outside selling, makes necessary the use of men who can devote their time and their talents to this work for the distributor, and who can assist dealers in training their salesmen.

Wholesalers of electrical supplies are finding themselves with more and more lines of specialty electrical goods, such as motor controls, electrical control instruments, lighting, etc., which are best put into the hands of specialty men who have the engineering and sales knowledge in each line, it was said. However, such emphasis on specialty salesmen for wholesalers was acknowledged to be practical only in large cities, that in the small town and rural areas, the industry must rely on the experienced all-around salesman.

Wholesalers' Rural Markets

Full development of the rural market for electrical supplies is being held up by a lack of good retailers and lack of a sufficient number of electrical contractors in these areas, according to information brought out in the talk by Stanley Y. Lakin, United Electric Co., Salt Lake City, and the lengthy discussion that followed. The long distances between rural customers has made it difficult for contractors to work profitably in making electrical installations, thus leaving the work to the farmer himself to wire his home and farm. As a result, the latest in farm electrical equipment is not finding the market that could await it under different conditions. There is definitely a need, the meeting disclosed, for more use of farm electrical experts by the wholesalers serving those areas.

What economies of time, money and better service can be expected from modern warehousing facilities was brought out in a talk by E. A. Phillips and the discussion that he led. Points covered by Phillips included: (1) at the moment there was nothing radically new in materials handling equipment, but that there had been many improvements in prewar equipment; (2) there is no question about the savings that can be made by using mechanical handling equipment under ideal conditions; (3) much of the equipment on the market does not lend itself to economical use by the small wholesaling houses. When working with small or broken lots, often it was cheaper to use manual labor.

Women's Meeting

For the first time, the women guests were accorded a program of their own which included more than the usual sight-seeing and bridge games. On Wednesday, a special ladies meeting included "The Dawn of Better Living Electrically," presented by Elbert Kramer and Clesta Meyer of the Westinghouse Electric Corp.

On Tuesday and Wednesday afternoons, golf held the spotlight, with play for the famous Copper Cup, the Manufacturers Cup, the Central Station Cup, and the Clendenen Trophy.

At the regular elections of the Pacific Zone of NEWA, William M. Jewell, WESCO, Seattle, was elected chairman of the zone for the coming year, succeeding E. E. Karsten, Gough Industries, Los Angeles, who has served for 1½ years. The next meeting was scheduled for Salt Lake City in the spring of 1949.

Officiating at the Fall Convention, along with Chairman Karsten, were the general session chairmen, L. E. Starkweather and W. M. Jewell, and the convention committee, Fred G. Goss, Ralph Rohrbach, and O. G. Thompson. The program committee included L. G. Berger, L. E. Starkweather and H. E. Perl. S. B. Gregory and A. W. Rockwell handled arrangements for the social stag, while E. A. Phillips and Jack Bisset arranged for the golf program.

NWEL&P

The Business Development Section of Northwest Electric Light & Power Assn. plans to hold its fall planning meeting in Portland, possibly Nov. 9 and 10, according to preliminary arrangements made by J. F. McAllister, Uath Power & Light Co., chairman of the section, and Berkeley Snow, managing director. Assignments of committee activity and the work for the year will be discussed and determined at this meeting.

IES

The Illuminating Engineering Society has formed a new chapter in the Northern California Section. The Mother Lode Chapter at Sacramento received its charter at a formal presentation in Sacramento Oct. 1.

Presiding at the dinner meeting, which was attended by some 70 members and guests, was H. H. Robison, chairman of the Northern California Section. Presentation of the charter was made by Dr. Leland Brown, retiring regional vice-president of the Society. He also presented Al Perdue, chairman of the new chapter, with a gavel from the youngest chapter of the Society.

Other officers of Mother Lode Chapter are Paul Carrington, vice-chairman; William Flynn, secretary-treasurer; E. Wismer and Tad Barnum, managers.

Following the presentation, the group enjoyed a talk and demonstrations on color by Dr. Gordon L. Walls, associate professor of physiological optics and optometry, University of California.

Utah Chapter, IES, met at Utah Power & Light Co. auditorium on Oct. 18 to see a demonstration—The Magic of Black Light—presented by Dr. H. T. Plumb.

Street lighting was discussed by G. A. Trosper, street lighting engineer, PG and E, and A. E. Simmons, district traffic engineer, operations, Division of Highways, when the Northern California Section, IES, met on Oct. 19 at its new meeting place, Marine Memorial Club, San Francisco.

Officers were installed at the annual get-together of the Southern California Section, IES, early in September. Bill King, district manager of Electric Machinery Mfg. Co., Los Angeles, presented slides on patents of interest to lighting men.

Basic principles of color, light and vision were reviewed by Robert Bromberg, research engineer, U.C.L.A., and psychological considerations of importance to illuminating engineers, discussed by George E. Mount, department of psychology, U.C.L.A., at the October meeting of Southern California Section, IES.

Electric Clubs

J. Clark Chamberlain, secretary-manager of San Diego Bureau of Radio & Electrical Appliances, and newly elected president of International Association of Electric Leagues, briefed Electric Club members of San Diego on the national appliance outlook at the club's Oct. 19 meeting.

Officers of the new Mother Lode Chapter of IES in Sacramento: Tad Barnum, Wm. Flynn, secretary, Al Perdue, chairman, Paul Carrington and Ed Wismer

First showing of the Anaconda Wire & Cable Co. sound color film, *Nerves of the Nation*, was held at the San Francisco Electric Club luncheon meeting late in September. The film was later presented to East Bay Electric Club by Lee Hayward.

East Bay Electric Club's Oct. 25 meeting on the economic aspects of television was presented by J. H. Landells of Westinghouse Electric Corp.

NECA

A preconvention meeting of District 6, National Electrical Contractors Assn., was held in San Francisco, Oct.

23-24, too late to report in this issue. On the agenda prepared by T. L. Rosenberg, Oakland, district vice-president, were a review of the by-law and constitution changes that are being submitted to the national convention at Miami Beach, Fla., Nov. 30-Dec. 3. Other policy changes in NECA management were also due to be brought up for action by the district as a whole, which comprises the Seattle, Spokane, Portland, Sacramento, Stockton, San Francisco, Northern California, Southern California and San Diego chapters, and Salt Lake City chapter delegates were due also to attend.

San Francisco Electrical Contractors Assn. Inc., an NECA chapter, moved into new quarters in the Western Merchandise Mart, at 1355 Market St., San Francisco, suite 557. It left an old loft building at 1434 Howard St. in which it has had its offices and meeting room since depression days and the NRA code. Adjacent to its own offices are those of the Employees Benefit board (pension plan). For meetings it uses the Green Room on the 9th floor of the Mart. The association held a special meeting there Oct. 14 to elect its governor on the NECA board of governors and to instruct its delegates. Clyde L. Chamblin, past president of NECA and of the San Francisco association, was named governor. President W. B. Baker was named chapter delegate to the convention. E. R. Cornish, field representative for NECA in district 6, will start a class in estimating for the knob and tube group of the association in November. Some 40 members signed up for the classes.

Board of directors of the Northern California chapter, NECA, was to hold a quarterly meeting in Oakland, Oct. 22. All of its branches have been active. The Alameda and Contra Costa County branches held a joint meeting Oct. 12, at Orinda and heard Charles Barkis, Trumbull Electric Mfg. Co., describe the new high-capacity trolley systems and their application to industry. Santa Cruz and Salinas branches held a joint meeting Nov. 1 at Watsonville. N. S. Beyer, Bussman Mfg. Co., gave a talk on protection of electrical equipment and a demonstration of time-lag types of fusetrons. The southern Alameda county group met Oct. 27 at Castro Valley and had a panel discussion on a county electrical ordinance.

Association of Appliance Dealers

Concerned over the slowdown in installment selling in its territory Association of Appliance Dealers, Seattle, distributed a survey to determine the reasons for retarded credit sales, to find out how wide spread misunderstanding is on reimposed Regulation W, and from it will work out a corrective program. . . . At its Oct. 20 meeting the association reviewed survey results; also heard A. B. Merritt, local Federal Reserve officer in charge of administration of Regulation W, discuss the problem.

Howard Price, Intermountain Electrical Assn. president, who is spearheading a fall radio sales campaign in Utah and Idaho for all dealers and distributors, tied in with the RMA national advertising campaign. He also aided local television to get sportscasts

IEEDA

Suggested by the promotional committee of Inland Empire Electrical Dealers Assn., Freezer Week was held by Spokane dealers Sept. 27-Oct. 2 to help promote sales of freezers in the Inland Empire.

Following up last year's bulletin on salesmen's compensation plans, IEEDA is once again working on a series of compensation bulletins. Will compare and analyze various plans as a guide for its members.

Another activity IEEDA is planning is a salesmen selection bureau to help its dealers on sales personnel problems. Will give aptitude tests and interviews to bring potentially qualified appliance salesmen into the business.

Vancouver Electrical Assn.

W. P. Dobson, chief testing engineer, Hydro Electric Power Commission of Ontario and chairman of Canadian Standard Assn., recently addressed a meeting of Vancouver Electrical Assn., Vancouver, B. C. Members of Electric Service League and B. C. Inspectors Assn. participated. Dobson discussed rules and regulations of wiring practices.

IAEI

Inspectors problems and report on the 25th annual meeting of the section were taken up at the fourth quarterly meeting of Central California Chapter, Southwestern Section, International Association of Electrical Inspectors on Oct. 16. Meeting was held at PG and E office in Taft, Calif. After luncheon and the business meeting, members were conducted through the new Kern steam plant of PG and E near Bakersfield.

Informal report on the recent annual section meeting was made at the Oct. 12 meeting of Utah Chapter, IAEI. A proposed redraft of the by-laws was read by Laurence Baty, secretary, and turned over to the executive committee for further study.

EMEA

Useful directory of members of Electrical Maintenance Engineers Assn. of Southern California has been printed by Larsen-Hogue Electric Co., member company of the association. Directory contains business connection and address of all members.

So much enthusiasm was created over the *Information Please* panel at the September meeting of EMEA of Southern California that the committee finally had to call a stop because of the late hour. Experts with all the answers were EMEA members, Walter Reuland, Square D Co.; H. D. Easterbrook, Allen Bradley Co.; "Doc" Smedley, Smedley Technical Products; Paul Mullenbach, The Mullenbach Electrical Mfg. Co.; George Larsen, Larsen-Hogue Electric Co. Special guest and member of the panel to answer code questions was E. V. Muller, state of California, division of industrial safety.

In October southern California members were given the inside story on television—how it works and where it will go—from Dave Crandall, chief programming engineer for CBS and Times Station. Film was also presented by Micro-Switch Corp. on uses of small switching equipment.

Review of the history of fans with a discussion following was given by A. J. Bouey, district engineer, Sturtevant division of Westinghouse, at the Oct. 21 meeting of Northern California EMEA. Special demonstration on G-E products, with J. M. Dodds, engineer, explaining, was an added feature of the program. On Oct. 22 EMEA members took a field trip to the new mill of Columbia Steel Co. at Pittsburg, Calif.

SAVED 85 MILES IN 13 WEEKS

Range and Water Heater Study
Comparing the use of wood, as fuel, with electricity

1. **Purpose of study:** To obtain factual data on time, labor, and money saved by cooking with electricity as compared with wood under actual on-the-farm use. Also to observe advantages of improved kitchen arrangement.
2. **Location of study:** Farm of Mrs. Howard Sperber, Evans, Wash.
3. **Supervisor of study:** Washington Water Power Co., Spokane, Wash.
4. **Size of farm family:** 2 adults, 3 children (2, 11 and 15 years of age).
5. **Size and type of farm:** 320 acres—timber and dairying.
6. **Period of study:** (a) Wood range: 13 weeks, 3-8-47 to 5-24-47
   (b) Electric range: 13 weeks, 3-6-48 to 5-29-48
7. **Result data:**

	Wood range	Electric range	Savings in favor of electricity
(a) Time consumed cooking meals..	321 hr. 40 min.	144 hr. 15 min.	177 hr. 25 min.
(b) Time consumed cleaning range..	20 hr. 10 min.	16 hr. 40 min.	3 hr. 30 min.
(c) Time consumed removing ashes..	6 hr. 25 min.	None	6 hr. 25 min.
Total	348 hr. 15 min.	160 hr. 55 min.	187 hr. 20 min.
(d) Time saved by use automatic controls	None	120 hr. 15 min.	120 hr. 15 min.
(e) Distance walked cooking meals..	72 miles	20.6 miles	51.4 miles
(f) Distance walked carrying wood to range	7.3 miles	None	7.3 miles
(g) Distance walked disposing of ashes	0.7 miles	None	0.7 miles
Total (e, f, and g)	80.0 miles	20.6 miles	59.4 miles

(h) Number of persons served meals for which range was used:
Wood range: Morning—459; Noon—353; Evening—460; Total—1,272
Electric range: Morning—482; Noon—364; Evening—451; Total—1,297

(i) Amount of hot water used: Wood range: 1,555 gal.
Electric range: 3,499 gal.*

(j) Cost:
(1) Wood range (cooking and water heating) $45.00
(2) Electric range (cooking—424 kwh.; water heating—1,222 kwh.) 21.16
(3) Amount saved by use of electric range $23.84

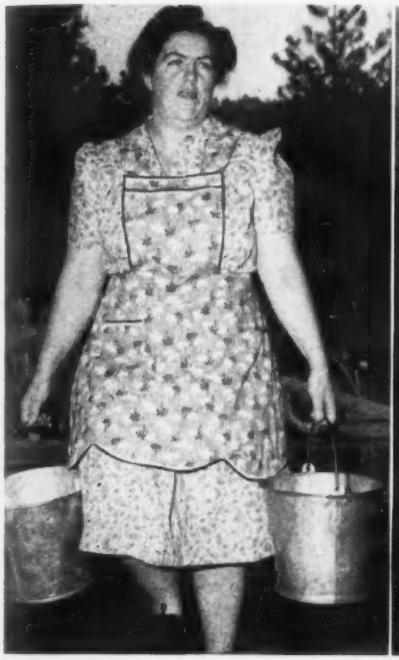
(*) Note increase in amount of hot water used.

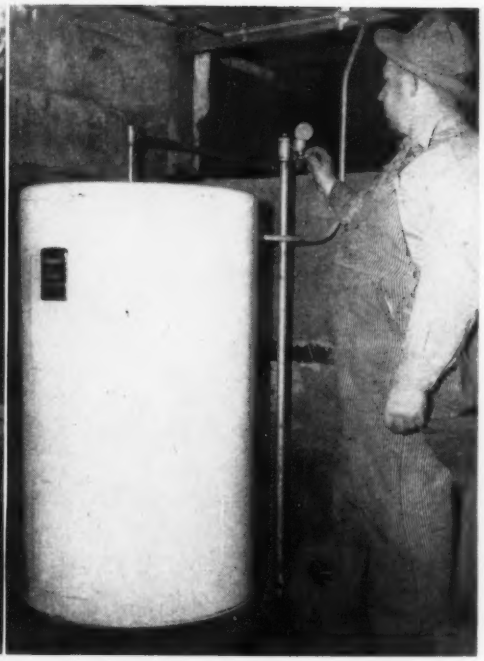
INSTALLATION of electricity in the farm home of Mr. and Mrs. Howard Sperber, Echo Valley, Wash., has saved this housewife 85 miles of walking and 187 hours of time according to the records of a recently completed 13-week cost and time study conducted by the *Farm Journal* and sponsored in the area by the Washington Water Power Co.

Early last year, Mrs. Sperber took part in the experiment which was also made in nine other farm homes in the United States. For 13 weeks she wore a pedometer which counted the steps taken in going about her household duties—without the aid of electricity. Careful records were kept during this time.

Last spring Washington Water Power built a new electric line to the Sperber farm and installed an electric range, hot water heater and electric pumping system. The equipment came as gifts of manufacturers who co-sponsored the program. A. G. Mayer, manager of the WWP farm development department in Spokane, supervised the study.

During the second phase of the experiment following installation of the electrical equipment, Mrs Sperber walked only 25 miles as compared with 110 miles during the non-electric period. Her cooking time was only 151 hours and 55 minutes instead of the





341 hours spent over the wood stove.

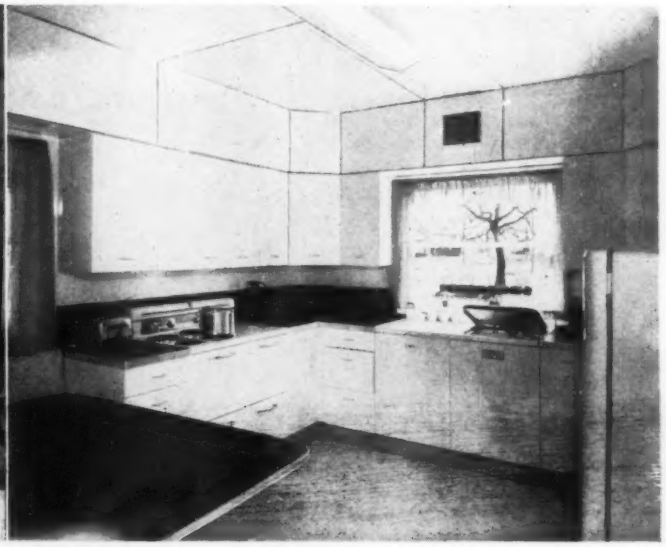
She used 3,220 gallons of water heated electrically, an increase of 1,532 gallons over the amount heated on the wood stove.

Results of the first phase of the experiment in 1947 showed that Mrs. Sperber had walked 110 miles in 13 weeks to prepare meals for her husband and three children. She also walked a total of 8 miles back and forth from her well which was 100 feet from the house. Sperber had spent 42 hours sawing and chopping wood for the stove, and a son had walked 16 miles carrying the wood into the house. Mrs. Sperber used 2,326 gallons of water, 1,688 of which had to be heated on the wood range. House work entailed a walking distance of 45 miles in a single week.

"The second part of the experiment was the most fun," Mrs. Sperber said. "I was amazed at how much time, money and work could be saved with the use of electricity."

All electrical equipment used in the experiment has been given to the Sperbers free of charge. WWP handled electrical wiring and equipment installation.

Basic facts like these should be useful to all dealers in convincing dubious customers of the work, time and money saving values of the electrical way of living.



Swift Transformation

Quite a kitchen for a jingle! But that is what won the complete transformation shown at the right to the kitchen originally like that above at the left, for Mrs. Raymond Terhaar, of Mt. Angel, Ore., in a national contest for a name for a new cleanser offered by Swift & Co. The prize was a complete General Electric kitchen, a full $5,000 worth, including the remodeling necessary. Design for the new kitchen was done by H. S. Wiggens, kitchen specialist of General Electric Supply Corp., Portland, and installed by R. L. Elfstrom Co., G-E dealer in Salem, not far from Mt. Angel. "Bob" Elfstrom, incidentally, is mayor of Salem. The Terhaar home is one of the oldest houses in Mt. Angel. Before the new kitchen was installed cooking was done from a wood stove. Lighting of the kitchen came from a single drop cord in the ceiling. As can be seen in the photograph it was necessary to cut a wider window over the dishwasher sink. Other rebuilding included new ceiling, cabinet closures to the ceiling, installation of ventilating fan, fluorescent lighting, a dining center and new linoleum. When the kitchen was installed it was made the object of widespread publicity throughout the area and Oregon generally. As the mother of six children Mrs. Terhaar, who had never before won a contest, was delighted and said she found the new kitchen a great help in caring for the needs of her family. The rebuilding naturally attracted the interest of the entire community and has developed more electric kitchen business in Salem and vicinity as a consequence.

Wholesale Expansions

WHOLESALERS of the West are making wholesale improvements and expansions. The trend is so general it is unfair to single out a few, as is done here, as examples. But here are three out of many!

Westinghouse Electric Supply Co. has expanded everywhere. Several such new plants and new branches have been reported. More are under way. At Salt Lake City recently Wesco moved into a new 40,000-sq.-ft. building at 210 Rio Grande St., and Westinghouse Electric Corp. has remodeled and moved in to the former 235 West South Temple Bldg. Pictured here is the large office at Wesco's new place. John Longden, manager, and T. A. Maughan, apparatus and supplies manager, are seen, right and left, in their offices; Amos Jackson at the desk. The new place abounds with features—three unloading docks, spur track, truck loading bay for four trucks, parking facilities, modern storage equipment and bins, materials handling equipment, an auditorium to seat 100, a coffee shop for employees and conference rooms on the mezzanine, and a model job of lighting throughout.

In Reno, the Saviers Co. recently moved to new quarters across town and away from the shopping district. But it brought with it a highly successful feature, its cafeteria-style parts department for radio supplies where service shop men and hams are tempted by the complete assortment and pick up their own orders quickly. This basement department is shown left.

In Spokane, Stubbs Electric Co. has a new place which combines in a compact space as shown below, service counter at left, fixtures under a canopy, parts on tables, an appliance showroom and office at right.

Fill Sockets, Sell Certified Lamps Plan Christmas Drive in Utah

Following a lamp bulb sales campaign among electrical dealers in the territory of Utah Power & Light Co. and Western Colorado Power Co., a certified lamp campaign will be conducted during the month of October. A preliminary meeting of electrical and department store lighting and advertising personnel was held Aug. 25. It was called by W. A. Huckins, sales manager, Utah Power & Light. Plans for the campaign were developed. All certified lamp dealers will receive a brochure outlining the sales features of certified lamps. The home service girls of the Utah Power & Light and Western Colorado Power companies will hold training classes for all sales personnel of the stores and present the certified lamp manufacturers booklet outlining the construction and sales features of certified lamps.

Advertising support will include colored advertising in the Salt Lake City and Ogden dailies, with tie-in ads by dealers. In addition to this, advertising will be carried in 55 weekly newspapers, spot announcements on the radio and billend advertising messages will also be used.

The previous lamp bulb campaign featured a window display contest. Prizes were given in each city for the best window display featuring lamp bulbs. A similar advertising campaign supported the activity.

The Intermountain Electrical Assn. participated in these programs.

A Christmas gift campaign is in preparation. The slogan will be, "Electrical Giving for Better Living." An extensive advertising promotion and display material will be provided.

On the commercial cooking front, one long neglected because of war diversion of this type of equipment, a flyer into fry kettles was taken in September and October. In cooperation with Hotpoint and its dealer, Restaurant and Stores Equipment Co. of Salt Lake City, a three-day trial was offered restaurants and other places doing cooking. The commercial and industrial sales forces of the Utah Power & Light Co. and Western Colorado Power Co. followed up post cards returned from a broadside mailed to all commercial cooking accounts. Each division was supplied with a sample fry kettle to be loaned for the free trial. Its advantages were talked up. If the customer wanted to buy one or more he was aided in placing the order with the dealer. Homer Shaw of the main office headed this program.

As an interesting sidelight, the home economists of the company were briefed on the use and advantages of commercial cooking equipment during their September refresher training meetings in Salt Lake City, called by Evelyn Hansen, home service director. Purpose of this training was to prepare them to advise and assist the cooks in grammar and high schools who prepare the food for the school lunch program. The Utah Power home economists are to call on every school during the year, and will give individual instruction on electric cooking equipment or address groups of cooks and demonstrate equipment to them. Therefore they were themselves schooled by the distributors and dealers in restaurant equipment.

The home economics program also includes holding of electric cooking classes in dealers' stores for the dealer personnel. These classes will illustrate ten advantages of electric cooking, discuss the particular features of the ranges sold by that dealer, show salespeople the results obtained from their own ranges and help them build a good sales story. These will be in two one-hour classes.

Promotion of home lighting has already been referred to above. The home economists will train dealer personnel to sell certified lamps.

Basement auditorium of Utah Power & Light Co. in Salt Lake City is being remodeled to install an automatic laundry and provide more modern types of lighting. Similar modernization will take place at all offices.

Adequate wiring promotion goes on all the time. One of the most effective promotions took place at the state fair where the Utah Power exhibit used the "Spot the Outlet," game, similar to bingo, as an attraction. And it was just that, for it kept crowds at that booth all the time, trying to spot enough outlets on floor plans of rooms to win a free lamp bulb. The latest pamphlet on adequate wiring advises to "plumb ahead" as well as "wire ahead" for electric dishwashers and disposals, and contains diagrams for plumbing connections for the latter.

The entire fall and winter sales stimulating drive of the company was launched at the sales managers meeting recently, at which Roy Ashworth, commercial vice-president, told the managers, "Don't worry about power shortages. You keep on selling. It is your business to sell. Let someone else worry about power production."

At that meeting, presided over by W. A. Huckins, sales manager, reports of conditions and new business potentials were heard from each division man. George B. Earl, Salt Lake division; W. J. Critchlow, Ogden; W. L. Faddis, southern; J. N. Stephens, Preston; K. L. Klingler, Rexberg, and D. L. Holt, Western Colorado Power, reviewed the competitive situation from gas or LPG, business conditions, new leads, cooking schools, IEA activity, etc.

J. H. Shaw outlined the fry kettle campaign; E. M. Naughton reviewed the power supply and expansion program; G. B. Walker the industrial picture; J. F. McAllister the lamp bulb activity, certified lamp, adequate wiring and Christmas program; Evelyn Hansen the home economics program; and M. L. Cummings reviewed the advertising program. Outside speakers were D. O. Thurman, First Security Corp., who explained the new credit restrictions; John Longden, Westinghouse Electric Supply Co., who told what the appliance availability was; Carlos Stone, manager of International Electrical Assn., who spoke of its activities.

CL in Denver too

A certified lamp campaign was launched Sept. 8 in Denver at the Electric Institute, when electrical dealers, furniture and department store lamp salespeople were invited to a meeting to hear the details. Similar meetings are to be held in other cities served by Public Service Co. of Colorado. The campaign will run through September, October, November and December.

At the initial meeting, 17 attended from 14 stores in Denver and heard an outline of the program from Gaylord B. Buck, vice-president, Public Service Co. of Colorado. Mike Freyer, Colonial-Premier, representing the certified lamp manufacturers, described the features of the certified lamps to be used as selling points in the campaign.

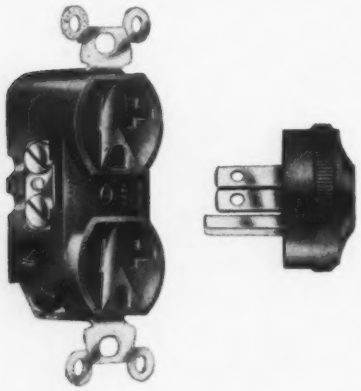
Miss Rece of the Electric Institute is to follow up the meeting with individual classes in the department stores to train sales personnel on certified lamp selling and James Stockett, dealer representative, will carry the same program to electrical dealers. The program is part of the Denver Plan.

Reproduced from poor material

APPLIANCE PREVIEW

Grounding Outlet (1138)

Bryant Electric Co. is introducing a grounding type convenience outlet designed for grounding exposed metal parts of portable appliances. This 3-wire outlet has two current-carrying contacts and one grounding contact built into the device. The grounding contact is electrically connected to the yoke



and to a terminal on the side of the outlet to which a grounding conductor may be connected. The binding screw of this terminal is hexagonal-shaped and colored green for easy identification.

In metallic system wiring, the grounding is made directly through the metal enclosure. For non-metallic systems, the grounding is completed through a third wire serving as a grounding conductor.

New type 3-wire caps are provided with a grounding blade so designed that it cannot engage with the current-carrying contacts, and, being longer, the grounding connection is made before the current-carrying blades make contact. These caps are available in bakelite, brown or ivory, and armored with cord grip in two sizes.

When desired, the outlet may be used in the conventional manner to accommodate standard 2-pole or tandem-blade caps, and can be either back or side wired. Outlet is all bakelite construction and is available in brown and ivory. Accommodates standard duplex convenience outlet plates.

Radio-Phonograph (1139)

Magnavox has added a console radio-phonograph, the Duncan Phyfe, for small homes. Cabinet woods are maple, finished in red maple or mahogany. Console is 33 in. high, 28 in. wide and 15½ in. deep. Components include a 210B chassis for AM broadcasts, a 12-in. speaker and automatic record changer with low-pressure crystal pickup. Cabinet stores up to 85 records.

LP Tonearm (1140)

A lightweight tone arm and two new crystal cartridges for use with the LP records have been announced by Webster Electric Co. Of stamped aluminum, the arm is correctly balanced to maintain precise 7-gram tracking pressure, the manufacturer states. Model F12 crystal cartridge is for exclusive playing of LP records. Model F11 is a double needle, combination cartridge playing either microgroove or standard records.

Coffee Maker (1141)

A new all-metal, 8-cup vacuum-type coffee maker has been announced by Westinghouse. Heat is provided by two elements, one 850 watts, the other 150 watts, built into the base. When the starter button is pushed in, both element are on, giving 1,000 watts for fast heating. When water rises to the upper bowl, all current is cut off automatically. The 150-watt element comes on again when coffee returns to the lower bowl; maintains coffee at serving temperature. Coffee may be reheated in the lower bowl, the thermostat automatically cutting off current when water is brought to a boil.

Water Heaters (1142)

A. J. Lindemann & Hoverson Co. has a new line of L&H automatic electric water heaters in 30- to 80-gal. round models, 30- and 40-gal. table-top models. They operate with Equato-Ring heating units, with individual or circuit-limiting adjustable thermostatic control, equipped with magnesium protector rod, standard NEMA wattages. Have Fibreglas insulation, heavy galvanized steel tanks held on steel tank supports integrally welded to base.

Heaters (1143)

Electromode's 1949 line of heaters will have a silver-grey finish. The new line includes portable and deluxe wall-type models for homes, stores and offices and heavy-duty unit heaters for farms, stores and factories. All models circulate heated air with a fan.

F Sunlamp (1144)

A fluorescent sunlamp has been developed by Westinghouse. It has the same appearance as the regular fluorescent lamp but has five times the ultraviolet output of the screw-in bulb-type sunlamp. It utilizes a new suntan phosphor which coats the inner wall of the tube and switches shortwave ultraviolet to the longer wave lengths found in natural sunlight, while phosphor in an ordinary F lamp changes shortwave ultraviolet to visible light. The sunlamp operates on the same circuits as a fluorescent lamp but for lowest operating cost and best results should be mounted in specially designed fixtures. Average rated life is 4,000 hours at six hours per start. It will be available in both 20-watt, 2-ft. and 40-watt, 4-ft. sizes. The bulb itself is made of special glass to help transmit the ultraviolet radiations screened out by ordinary glass.

Small Range (1145)

For confined kitchen areas, a compact range with four surface units and a full size oven is offered by Frigidaire. This range is 42 in. high, 21 in. wide and 25⅛ in. deep; has a one-piece, acid-resisting porcelain cooking top and back splash. The oven is a twin-unit Even-Heat; has

spun-glass insulation on six sides, a high speed broiler. Three 6-in. and one 8-in. Radiantube surface units offer five heats, are self-cleaning with removable bowl to catch spillover and act as a heat reflector. A cooking lamp and Cook-Master for automatic oven control are available at extra cost. A companion model with special hardware is available to fit with deluxe models in tandem arrangement.

ELECTRICAL WEST, 68 Post St., San Francisco 4, California
Please send me information about following CIRCLED items:

1138 1139 1140 1141 1142 1143 1144 1145

Name ..... Company* ..... Title* ....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

ELECTRICAL WEST

Sales Guide

FOR THE ELECTRICAL MERCHANT OF THE WEST © NOVEMBER, 1948

Christmas Gift Blessings

Each appliance offers many of them

Sure they are all shiny with chrome and plastic and in eye appeal alone most of the appliances will sell. But why not throw in a **blessing** or two that the appliance can give and, by exciting the imagination, generate a few more customers for it. If someone intends to buy an appliance for a gift, the mention of a few of the fine benefits that appliance can give its recipient will help to sell it, and it can conceivably excite a desire on the part of the giver to later come back and buy one for herself.

These days it pays to inject a little **selling** into every conversation. There is more merchandise available and customers are neither as flush as they were nor as desperate for the merchandise. They have to realize some **benefit,** some **blessing.**

May we remind you then, that table appliances in general offer these blessings to those who own them:

Save bother and housework. Appetizing and attractive meals can be cooked right at the table instead of in the kitchen. **Be a guest at your own table** instead of running back and forth to the kitchen. **Saves needless steps.**

Conserves food by cooking only what is needed, at the table. Automatic temperature contol on quality appliances insures against burning and wasting food. **Ideal of early risers** who must eat in a hurry and leave for work. Appliances left on the breakfast table enable preparing breakfast alone quickly. Allows others to sleep late if they wish.

Economical to operate, with low electric rates and fine efficiency, the heat is used only when needed, not wasted.

Cool summer cooking can be done on table appliances without heating the house or kitchen.

Add beauty and charm to the house, a note of refinement and good taste.

Portable, so that their useful blessings can be carried with you to the summer cabin or beach house for vacation cooking.

Versatility—each has many uses.

To be successful financially—

Analyze Your Inventory Situation

especially before beginning the New Year

Advises

Ken Hampton

INVENTORY accounting is one of the effective tools a retail appliance dealer must use to manage his business.

Inventory turnover is calculated on the relation of the cost of goods sold to the inventory cost of materials for sale on hand. For example, if sales were $100,000 for the year, as shown by the general ledger, then the cost of materials sold may be calculated as follows:

Starting inventory	$20,000
Purchases	73,000
Total	93,000
Closing inventory	26,000
Cost of goods sold	$67,000

By adding the two inventory figures and taking an average, it can be assumed that an average inventory of $23,000 existed during the period that is under study. By dividing $23,000 of inventory at cost into the cost of goods sold ($67,000) we arrive at a turnover of 2.9 times for the year.

That turnover figure is low enough to be taken as a danger signal. To be healthy and profitable on a margin such as shown above (Sales, $100,000; Cost of goods sold, $67,000; Gross Profit, $33,000 or 33 per cent on sales) experience has shown that a turnover of four times a year is a desirable standard to maintain.

To find the point to which the inventory should be reduced, take the cost of goods sold ($67,000) and divide by four. The result is $16,750, which is the amount of money which should have been invested in the inventory by this firm as an average for the year. We see that the firm has had too large an investment in stock for the volume being done.

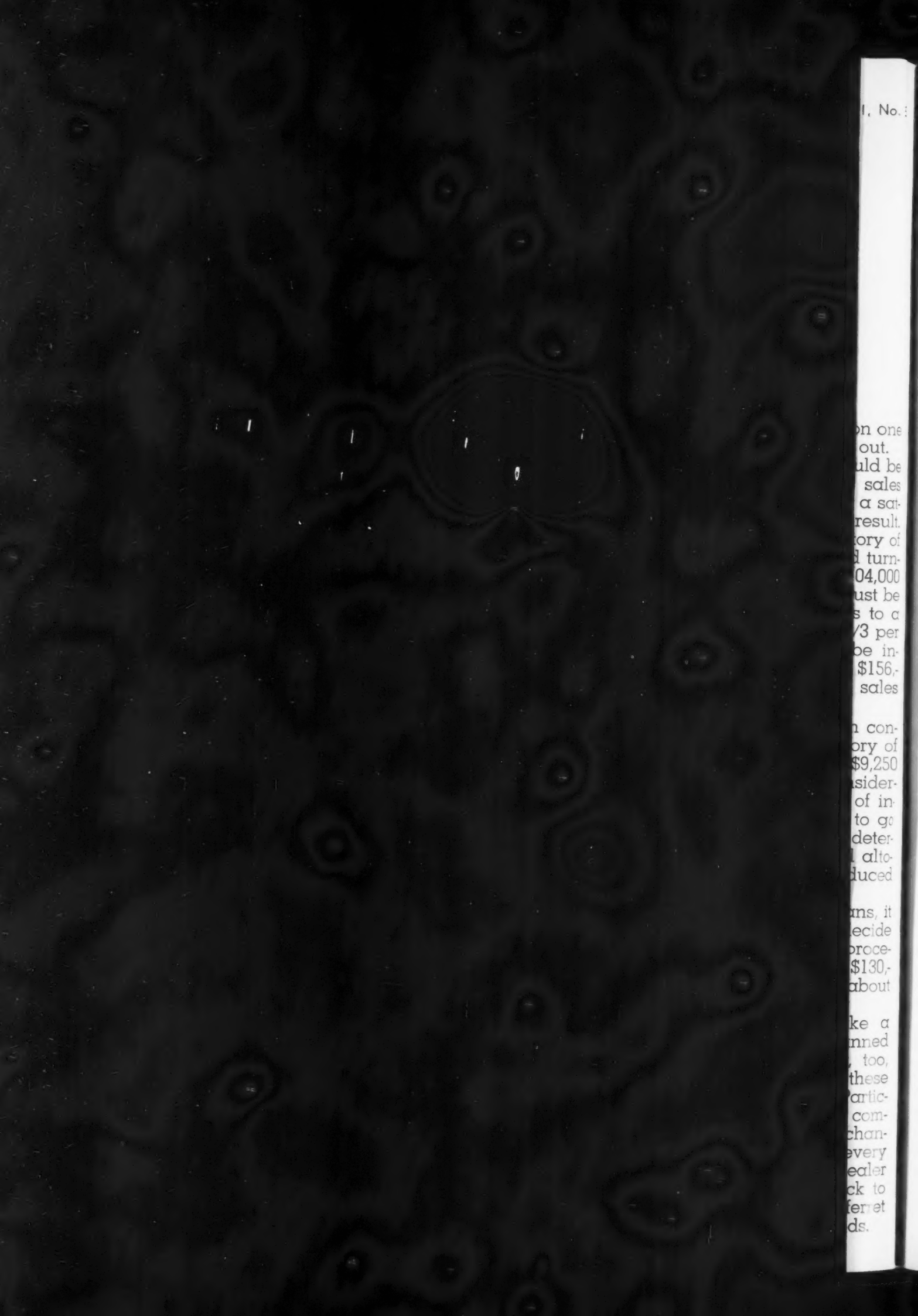
Two Plans to Consider — For the year ahead, this firm's management should consider two plans, then after deciding on one it should act aggressively to carry it out.

The first plan to be considered would be to determine if the coming year's sales could be increased to a point where a satisfactory inventory turnover would result. To do this we take the closing inventory of $26,000 and multiply it by the desired turnover, in this case four. The result, $104,000 is the cost of the merchandise that must be sold during the year. To covert this to a sales figure that will result in a 33-1/3 per cent gross profit on sales, it must be increased by 50 per cent. The result is $156,000, which would represent the sales budget for the coming year.

The other plan that the dealer can consider is to reduce the present inventory of $26,000 to $16,750. This reduction of $9,250 will appear as a big problem. In considering this plan and such a reduction of inventory, the management will have to go through the stock, item by item, to determine which ones should be dropped altogether and which ones need to be reduced in quantity on hand.

After a thorough study of both plans, it is likely that the management will decide on a plan that will embrace both procedures, setting a sales budget of about $130,000 and an average inventory of about $21,500.

To accomplish this goal will take a planned buying program and a planned selling program. Equally important, too, for the dealer who sets out to reach these goals will be **a mid-year check-up.** Particularly during an inflationary period, a complete physical inventory of the merchandise on hand should be made by every electrical appliance retailer. The dealer can use this mid-year inventory check to check on his rate of turnover, and to ferret out slow-moving or unseasonable goods.



ELECTRICAL WEST Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

November 1948 ©

Two video

Television is due to start in San Francisco and Seattle during November with test patterns and commercial broadcasts perhaps before the end of the month. Work on KPIX-San Francisco is moving fast. The antenna is set atop of the Mark Hopkins; rest of the equipment is being installed; a one-week television program is scheduled at Macy's Nov. 8. Seattle's KRSC-TV, owned by Radio Sales Corp. of New York, will begin commercial broadcasts Nov. 25.

Prepare

In Seattle the Assn. of Appliance Retailers and Retail Furniture Assn. met on Nov. 3 at a television dinner to hear from KRSC-TV, Seattle's first station, as to its plans, and to discuss dealer merchandising problems to be faced.

Tells how

Pardon the plug, but that's why Electrical West will have a first-hand, realistic and practical article next month on merchandising problems "When Television Comes to Town" in its December issue. The material comes from actual experience in Los Angeles, San Diego and Salt Lake City, where television is going through its growing pains now. That's the kind of service we like to give our readers--the real low-down from dealers, distributors, not just promotion puffs.

Top earnings

From our Washington bureau comes word electric appliance salesmen earn the best pay in department stores in 16 cities surveyed by the Bureau of Labor Statistics in April; are surpassed in only a few by furniture and bedding and floor covering men. Average weekly earnings of full time electric appliance salesmen, exclusive of premium for overtime but including commissions were: $172.33 in New York; $128.79 Pittsburgh; $114.18 Chicago; $111.88 Atlanta; $109.30 Dallas; $106.68 Seattle; $104.37 Philadelphia; $104.04 Portland, Ore.; $100.84 St. Paul; $99.05 New Orleans; $96.15 Boston; $94.57 Washington, D. C.; $94.40 Denver for men, $40.53 for women; $93.59 Oakland; $91.39 Toledo and $65.67 Providence.

Washer grounding

It seems a little thing and you might overlook it but it is important and will be part of washing machines and several other appliance equipment before long and must be reckoned with. For years electrical inspectors and safety people have been wanting to ground washing machines to prevent accidental shock in case of motor breakdown. Last edition of the National Electrical Code prescribed a three-pole receptacle at home laundry locations to ground washers to. Now National Electrical Manufacturers Assn. announces adoption of standards for a new type receptacle and attachment plug and some makers are even announcing them for sale now, Underwriters approved. So washers may soon be equipped with them, other appliances too.

NERA held its leadership conference in Los Angeles Oct. 25-26, and while it was disappointing in attendance, it was significant in who attended and in the serious and earnest way dealer problems were tackled. There'll be more of a report next issue, but here are some highlights.

First in West

Clif Simpson, managing director of National Electrical Retailers Assn. set forth a constructive program and earned respect by his attitude and handling of the meeting. Attendance grew the second day as those who came to see the first day rounded up more of their dealer friends for the second day. First day's session was to let dealers air their views on things that hurt them and their business. Committees met that night to digest and condense these views for suggestions to manufacturers and distributors for improvements. Emphasis was repeated that NERA was not a "gripe" organization. It wants to improve conditions and practices by bringing suggestions out of field experience.

Character of it

Subjects discussed included: making franchises mean something both ways; cross-distribution in the same market area by both plumbing and electrical wholesalers; need for better planning of repair parts and service information with new models; maintaining of guarantees; damage in transit; the growing "I can get it wholesale" evil from buying clubs, shyster brokers, dealers who violate their franchises; manufacturer and utility employee discounts; multiple sales to builders.

Problems talked

Two western manufacturers talked to the dealers--Leslie Hoffman, president of Hoffman Radio Corp., who opened vistas of what television will do to present living habits and said television was not a class but a mass business; and Bill Cranston, president of Thermador, who assured dealers there is a niche they alone can fill, despite chains and big stores, the customers who want personal attention and service. Robert Sample, Los Angeles Better Business Bureau, told how that organization goes after many dishonest trade evils.

Hear advice too

Shows that it is sometimes costly to be out of step. The Southern California Edison Co. has just finished its huge frequency change from 50 to 60 cycles. Had to adjust or replace 475,000 electric clocks, 380,000 fluorescent lighting fixtures, 160,000 record players, 140,000 timing devices, 58,000 refrigerators and 35,000 deep well pumps besides all the industrial equipment. Cost the company $37,500,000. Every day that it was delayed would cost more.

In step now

The AGA and gas appliance manufacturers and gas utilities will spend some $8,000,000 on promotion of gas ranges and water heaters within a year. Gas water heaters are to get about $1,260,000 worth of promotion, ranges $2,500,000 by the AGA and manufacturers. Have a "Court of Flame" theme and seals on water heaters and lots of glamor. Really trying to save the business. Servel, the advertising gossip says, is going after the bottled gas farm market with its refrigerator, water heater and air conditioner.

Gas attack

More changes at Western Merchandise Mart as things begin to hum again in preparation for the next market, Jan. 31-Feb. 5, 1949. Sues, Young & Brown have taken the L. H. Bennett space on the fifth floor, one formerly had by Frigidaire. Bennett has cut out his record business but still has Monitor appliances. Thor Corp. will have larger space and move in its office on the fourth floor, space 458. (Its old space at 1434 Howard St. is to be taken by Electrical Appliance Service for a parts distribution warehouse). Sutton & Clark have moved to space 468. Former Thor space is now display room for Packard-Bell.

Mart changes

Spokane has a new plumbing code which provides a special permit for water heaters and water softeners, sets a minimum trap size of 1½-in. for dishwashers, disposal units and automatic washers. — Plumbing

Inland Empire Electrical Dealers Assn. has plans for a salesman's institute, a two or three day school in fundamentals of selling, for next February. Its manager, Bob Wilkinson, has been putting out for member use some excellent analyses on salesmen's compensation plans too. In November it holds its fall sales conferences in Spokane and in several of the divisions. — IEEDA active

A big electric range and water heater campaign has started in the rural territory around San Diego. San Diego Gas & Electric Co. is supporting it with cooking schools run by Margaret Werner, home economist, advertising and store display aids to dealers. Dealer sales manuals condense the sales appeals each for the range and water heater. Tags and banners used are similar to those Southern California Edison Co. has been using on its similar campaign. — Rural drive

W. J. Lancaster Co. has been appointed exclusive representative in northern California and western Nevada for the five-in-one shop tool outfit, Shop-Smith, made by Magna Engineering Corp. of San Francisco. R. C. Christiansen is associated with Lancaster. This is the first distributorship in the U. S. of this power tool. Sunset magazine featured its use in several pages of ideas for making home equipment. — Home shop

Sales features of the new Hamilton Beach food mixer are illustrated in a colorful folder put out by the company for its dealers. Designed for counter use and distribution the folder describes the latest improvements of the mixer. — Folder on mixer

Westinghouse is producing a new light weight electric iron called the Streamliner. Weighs three pounds; has a thumb-tip temperature control dial with fabric markings at the base of the handle. Suggested price is $12.95. — Light iron

"Television Theatre," a leatherette bench seat, is one answer to seating problems for home television shows. Manufactured by Grand Hassock Co., the chest seat contains five camp stools on the inside. Bench seats two. — Sitting pretty

This year you'll see Christmas trees in motion. Kasson electric Christmas tree turner manufactured by General Die and Stamping Co., enables tree to revolve three times a minute. Turner also serves as tree holder. — Tree in motion

Magnavox has a new model called the Traditional which combines AM-FM radio, phonograph and television. Has a 12-inch Duosonic speaker, 10-inch television tube and record changer which plays recordings at both 78 and 33 1/3 rpm. — New set

Hotpoint will introduce two rotary switch electric ranges this month. Priced at $199.95 and $239.95, both ranges are equipped with three high speed Calrod surface cooking units. — Two ranges

Norge Division of Borg-Warner Corp. will introduce its new and expanded line of household appliances to distributors and their salesmen at convention meetings in November and December. Western meeting will be held at the Hotel del Coronado, Coronado, Calif., Nov. 29-Dec. 1. — Preview line

Show dates

Following Western Winter Market, scheduled for Jan. 31-Feb. 5 at the Western Merchandise Mart, San Francisco, the Western Gift, Stationery, Jewelry, Toy & Housewares Show will be held Feb. 6-10 at the Civic Auditorium in San Francisco. Pacific Northwest Gift & Art Show is scheduled for Feb. 13-17 at the Olympic and New Washington Hotels, Seattle; and the Portland Gift & Art Show for Feb. 20-23 at the Portland Hotel.

New NEMA Section

Household Sink Units Section is a new product division of National Electrical Manufacturers Assn. which has been formed by nine manufacturers of electric food waste disposers and dishwashers. Chairman of the group is R. C. Cameron, manager of the dishwasher and Disposal department of Hotpoint. Vice-chairman is Millard F. Foist, assistant sales manager of Given Mfg. Co., Los Angeles. One objective of the new section will be to promote the health aspects of the disposer and dishwasher.

Holiday lights

Royal Electric Co. has two special Christmas lighting packages for the holiday season. "Royalite" tree sets are boxed in full-color display boxes designed to stand upright. Is also putting out a 22 inch high Visca tree of 11 bubbling lamps.

Lights with a greeting

Another idea in Christmas lighting is the holiday greeting lamp made by Sheldon Electric Co. Illuminated 10-watt lamps carry the words "Merry Christmas" or "Happy New Year" on the face of the lamp in red or green.

Winners

National second place winners in a sales training organization contest for distributors sponsored by Hotpoint were O. W. Amador, sales manager, Gorman Engineering Co., El Paso; Lee DiAngelo, sales promotion manager, GESCO, Phoenix; and W. E. Derbyshire, wholesaleman, Graybar, San Francisco.

Radio ready

Emerson Radio and Phonograph Corp. announces that it is now shipping its latest portable three-way radio model to the trade. The model 568 is a five-tube set with a price listing at $29.95.

More ironers

Two new Bendix ironer models are being introduced at a series of distributor and dealer meetings in key cities. Standard model J will retail at $179.95, and portable model L at $64.95. Dealers will receive merchandising and sales promotion aids for use in introducing the models.

Three video sets

United States Television Mfg. Corp. is putting out a 15-inch television console model priced at $1,495. UST is also manufacturing two new commercial television models, made especially for public places, which yield television pictures of 475 and 675 square inches.

Revised catalog

Lightolier has revised its stylebook with a new supplement containing the new Advance Pacemaker group, Decoralite designs, and economy series of ceiling fixtures made by the company.

Another washer

Hotpoint announces that it is scheduling production of a new automatic washer in the medium priced field. The washer is expected to reach the market early in 1949.

Yule lights

New type of Christmas tree lights, an adaptation of "pin-on" lights that can be placed anywhere on the cord in varying numbers, are being put out by Iron Fireman Mfg. Co., Portland, Ore., for On-a-Lite Corp. The customer gets a 12-foot cord and eight detached light sockets complete with colored bulbs in a set.

"Give us the tools..."

TO SURVIVE

America Must Have Better Tools

IN THE past twenty years the United States has failed to provide its workers with enough new tools and equipment.

To most Americans this statement will come as a shock—or will be doubted. We are quite complacent about our industrial equipment, for easily understood reasons.

Throughout the '30s we heard continuously the propaganda line that the United States had become a "mature economy." The job of equipping America with industrial plants and tools was said to be largely done.

Now, knowing that industry is spending billions to expand and rebuild its plants, many people assume that the result must be a first-class industrial system.

A further powerful inducement to complacency is the vastly *worse* industrial condition of most of the rest of the world. When Americans look abroad in almost any direction they see shattered plants and equipment. A natural reaction is that we are sitting pretty.

That is a dangerous reaction. Between depression and war, we have failed to build the tools and equipment we need. This condition is dangerous for three reasons:

1. *From bitter experience we know that national security depends first and foremost on the capacity and readiness of our industrial equipment.*

All of our plans for stabilizing prosperity assume a world at peace. The greatest menace to peace would be an unarmed America, unable or unwilling to keep herself strong and ready for defense—strong in spirit, in resources and in the all-important industrial plant and equipment.

2. *Whether Americans live well—or badly—depends directly on the kind and quality of tools used by American workmen.*

This is true for all workers, and for every worker—from a garage mechanic and his wrenches to a steel mill gang and its rolling equipment. In a monumental study of "America's Needs and Resources" the Twentieth Century Fund found this fact: The improvement in the real income of the American people has more consistently followed the amount of power used in industry than anything else. What the workman worked *with* determined, more than any other factor, the size of his pay envelope, and what it would buy.

3. *Our success in stabilizing prosperity will depend largely on what we do about building new tools and equipment.*

About 30% of our industrial workers are employed in producing tools and equipment. Steady employment for them is essential to our over-all prosperity.

How far have we fallen behind in providing new plants and equipment?

Estimates vary. Here is one rough estimate: If we had built new industrial facilities during 1930-48 at the rate we did in the prosperous '20s, we would have spent at least $100 billion more than actually we did.

To get a better and more complete measure of this deficit, McGraw-Hill is undertaking a survey of American Business' Needs for New Plant and Equipment.

Businessmen all over the nation are being asked to answer questions like this: How much

money would you need to put your plant in first class condition? How much are you planning to spend for new plant and equipment? Where do you expect to raise the money? The results will be reported later in this editorial series. Already the survey shows we have fallen many billions of dollars behind.

Some shortcomings are apparent to everyone. They are revealed in a lot of rickety transportation facilities and in rundown buildings.

Many other deficiencies do not come into general view. They are, for example, the antiquated machines in our plants. Of the privately-owned machine tools in use in 1945 – when the last census of metalworking equipment was made by AMERICAN MACHINIST – 54% were more than 10 years old. Their average age is higher today.

It is true that in recent years we have hit new highs in total national production. But we have done so by putting far more people to work than ever worked before . . . and by driving equipment to the limit of its waning endurance, sometimes beyond. It has not been done *primarily* in what is by all odds the best way to increase production—to use more and better and more modern tools and equipment.

Haven't we overcome much of this twenty-year deficit by rushing to build new plants since the end of the war?

No. For two clear-cut reasons:

1. The accumulated shortage is tremendous. The total of about $40 billion, which has been spent for industrial plant and equipment since VJ-Day, has not wiped it out.

2. Some key industries have had difficulty in getting the facilities they need. Take steel, for example – the industry that turns out our most basic industrial material. Its needs for new equipment are measured in billions of dollars. To pay for that equipment, it should have *risk capital* – money which people are willing to invest with a risk of losing for the sake of gain. For steel is an up-and-down industry. Earnings on its common stocks inevitably share both ways in those ups-and-downs.

Since the war, steel, in common with most of industry, has been unable to market new common stock successfully. Its outstanding stock is now selling for only about one-half the current net worth of the industry's present assets. With investors willing to pay only 50 cents on the dollar for its facilities, the industry can not readily sell stock to pay for *new* plant and equipment – at higher prices even than the old.

Why can't steel – and other industries – attract people who are willing to risk their money retooling America?

The full answer to that serious question must be left to future editorials in this series, for it involves many things . . . tax reform . . . mobilization of small savings . . . a new respect for corporate profits.

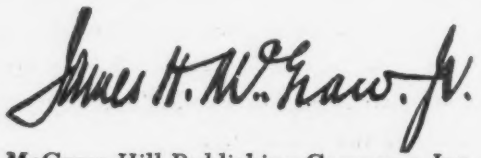
This first editorial seeks simply to emphasize two fundamentals:

First, our standard of living improves with the *quality* of our industrial equipment.

Second, American industry and American workmen badly need billions of dollars worth of better equipment *now.*

The American people must understand that *not only our continued prosperity but also our security as a nation depends upon giving American industry more and better equipment.*

"Give us the tools." This was Winston Churchill's cry for help to win the war. Only if we give American industry new and better tools will we have a chance to win abiding prosperity at home and good order abroad.



President, McGraw-Hill Publishing Company, Inc.

★ THIS EDITORIAL, and a series to follow, will be devoted to a single problem – how to provide American industry with the equipment needed to improve that envy of the world, the American standard of living. No more important problem confronts us today. Upon our wisdom in handling it depends not only the degree of our prosperity, but also our security as a nation.

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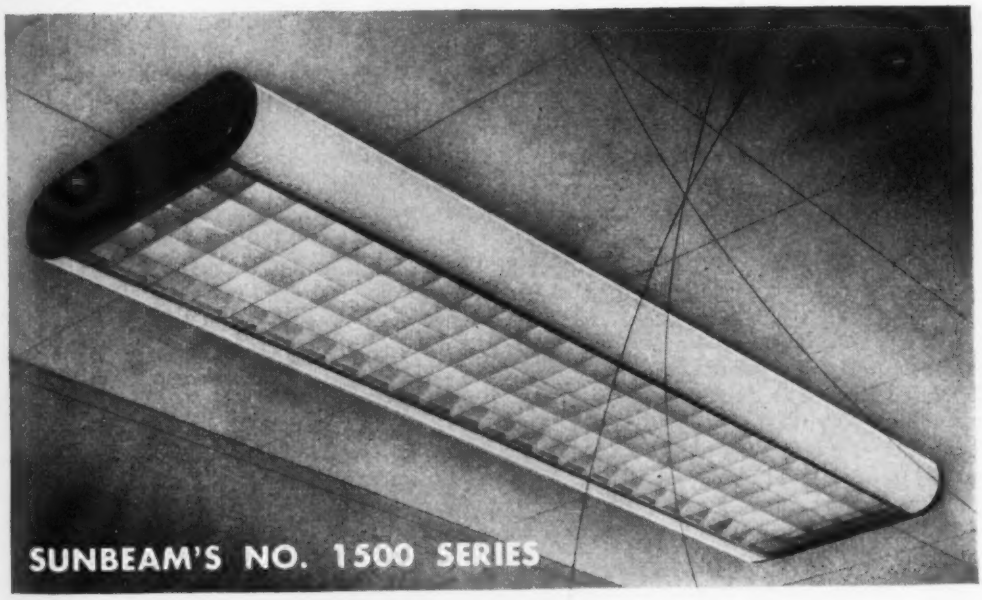

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THE MONTH IN BRIEF

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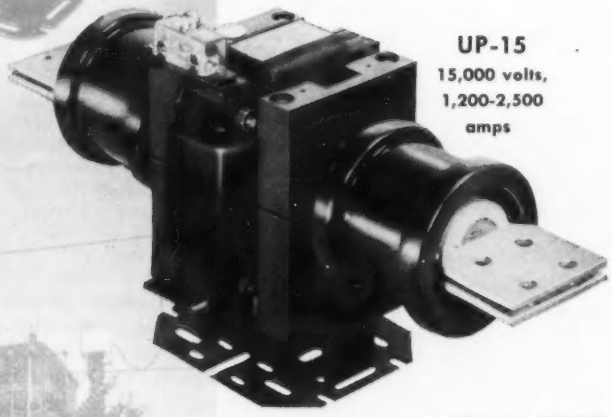

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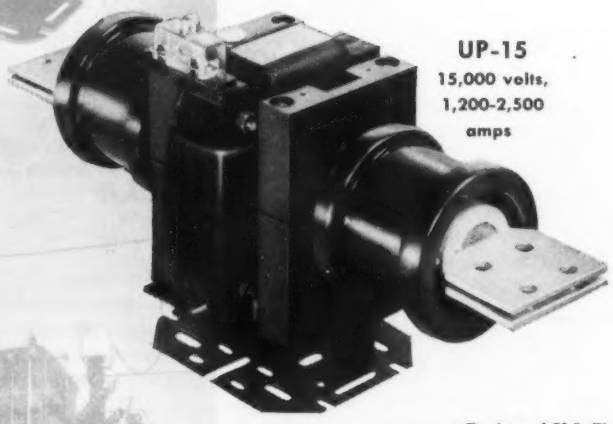

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Size—Inches L.	W.	T.	Stock Numbers Grade 440	Grade 460
1½	1	¼	A00	B00
1½	1	⅜	A01	B01
1½	1	½	A02	B02
1½	1	⅝	A03	B03
1½	1¼	¼	A04	B04
1½	1¼	⅜	A05	B05
1½	1¼	½	A06	B06
1½	1¼	⅝	A07	B07
1½	1½	¼	A08	B08
1½	1½	⅜	A09	B09
1½	1½	½	A10	B10
1½	1½	⅝	A11	B11
2	1	⅜	A12	B12
2	1	½	A13	B13
2	1	⅝	A14	B14
2	1	¾	V15	B15
2	1¼	⅜	A16	B16
2	1¼	½	A17	B17
2	1¼	⅝	A18	B18
2	1¼	¾	A19	B19
2	1½	⅜	A20	B20
2	1½	½	A21	B21
2	1½	⅝	A22	B22
2	1½	¾	A23	B23

(NOTE: Grade 440 is Carbon Graphite) (NOTE: Grade 460 is Electrographitic)

Size—Inches L.	W.	T.	Stock Numbers Grade 440	Grade 460
2	1¾	⅜	A36	B36
2	1¾	½	A37	B37
2	1¾	⅝	A38	B38
2	1¾	¾	A39	B39
2½	1	⅜	A24	B24
2½	1	½	A25	B25
2½	1	⅝	A26	B26
2½	1	¾	A27	B27
2½	1¼	⅜	A28	B28
2½	1¼	½	A29	B29
2½	1¼	⅝	A30	B30
2½	1¼	¾	A31	B31
2½	1½	⅜	A32	B32
2½	1½	½	A33	B33
2½	1½	⅝	A34	B34
2½	1½	¾	A35	B35
2½	1¾	⅜	A40	B40
2½	1¾	½	A41	B41
2½	1¾	⅝	A42	B42
2½	1¾	¾	A43	B43

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NOTE—¼" and ⅜" thick brushes supplied with ⅝" open terminals—other ¼" open terminals.

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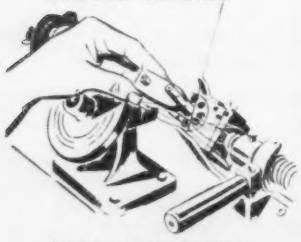

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THIS MONTH'S NEWS

PG&E Named in Preliminary Recommendation on Kings River

A preliminary recommendation to the Federal Power Commission on pending applications for development of the Kings River in central California has favored the Pacific Gas and Electric Co.

John C. Mason, staff counsel for FPC, has recommended that PG and E receive a license for power development, providing the utility agrees to compensate irrigationists for interference with their operations.

The Bureau of Reclamation and the Fresno Irrigation District also are seeking permission to develop the north fork and main channel of the river.

Mason said that California's critical power situation made it appear inadvisable to wait for Congressional approval of the bureau's plans for the river, assuming that approval could be obtained.

He pointed out that "The bureau admits its proposed Delta steam plant is necessary for the proper utilization of Kings River hydroelectric power and there is no assurance Congress will appropriate funds for that plant."

He advised against endorsement of the irrigation district's application because of its "indefinite" status.

Full Seattle Council Will Negotiate Utility Purchase

Seattle City Council has decided that all negotiations for the proposed purchase of Puget Sound Power & Light Co. properties by City Light will be conducted by the full council membership at public sessions. Preliminary negotiations had been conducted by two members of the council. Copies of the engineering survey report on the private company are expected to be completed early in December.

● BIDS for construction of a $1,000,000 diversion dam on the Skagit River hydroelectric project have been called by the Seattle Municipal Board of Public Works. The concrete gravity dam, 43 ft. high and 275 ft. long at the crest, will replace a wood crib structure which was built in 1923. It will increase the head above the Gorge power plant tunnel about 7 ft., according to Lighting Superintendent E. R. Hoffman.

for UNEQUALLED SPEED of installation specify Smithcraft Troffers

Regardless of the type of ceiling involved, Smithcraft Troffers are unsurpassed for speed of installation. This speed has resulted in one electrician cutting his estimated charge of installation in half after actually putting up a few sections of Smithcraft Troffers. This time and money saving installation is made possible by the patented Aligner Hanger and other exclusive Smithcraft developments.

For use with louvered troffer, Smithcraft has developed the exclusive Duo-Cam Hanger which hinges or releases louvers by simple finger tip pressure.

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The Smithcraft Trim Flange, which snaps on reflectors, covers all ceiling irregularities simply and easily.

For troffers that "go up faster" see your Smithcraft Representative.

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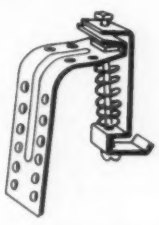
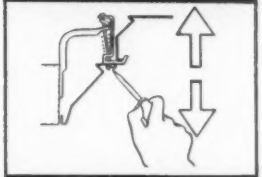
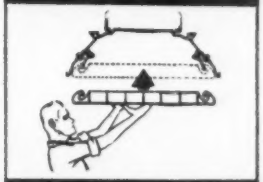


Aligner Hanger can be installed in any ceiling without exact positioning.

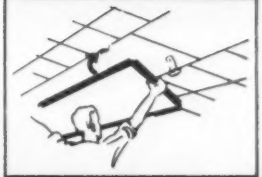
Longitudinal adjustment — simply slide unit on Aligner Hanger arms until it is in desired position.



Vertical adjustment can be made before or AFTER installation has been completed.



Duo-Cam Hanger hinges or releases louver by simple finger tip pressure.



Hinged Envelope Frame locks glass securely in metal envelope, permits access to troffer interior without removing glass.

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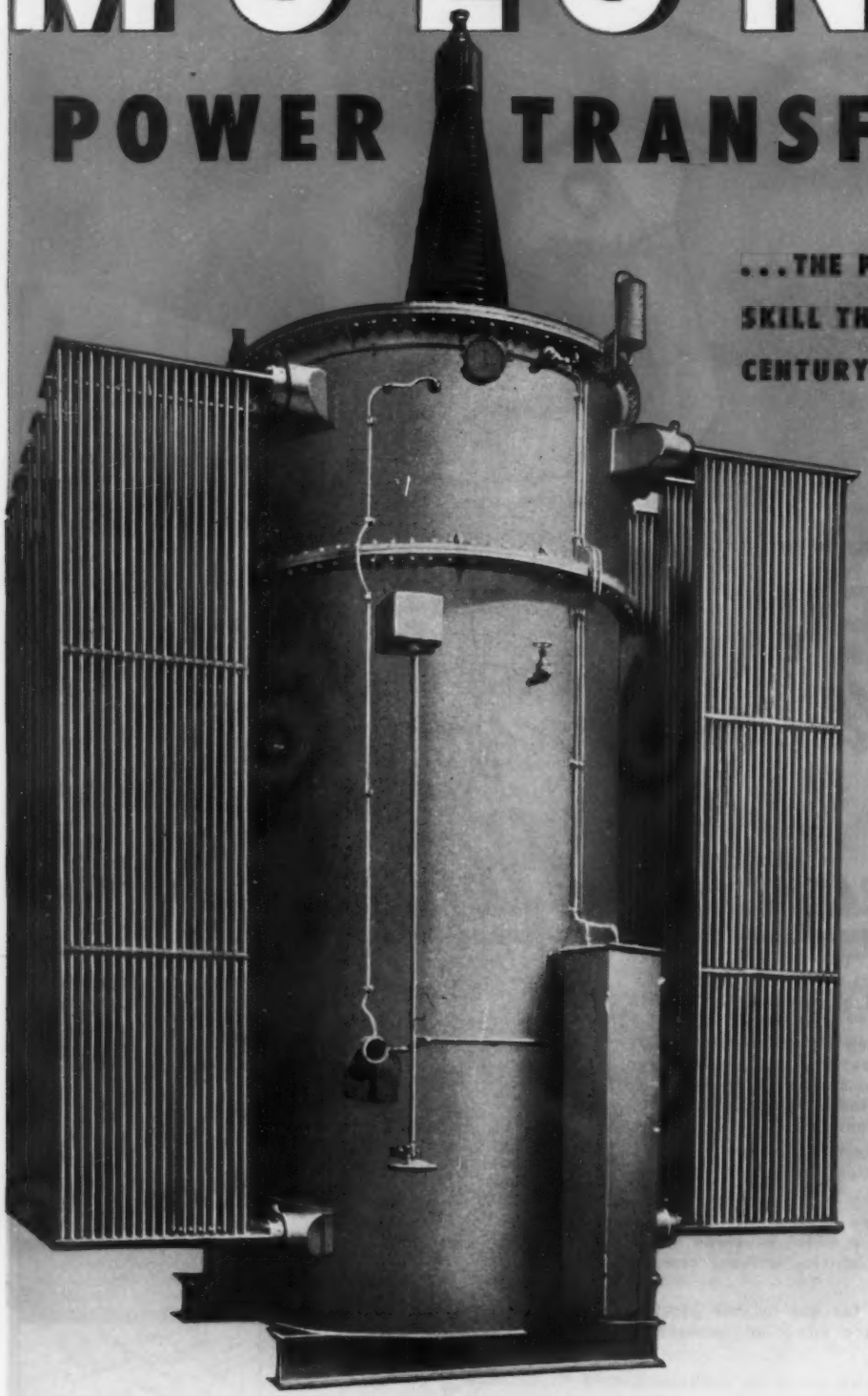

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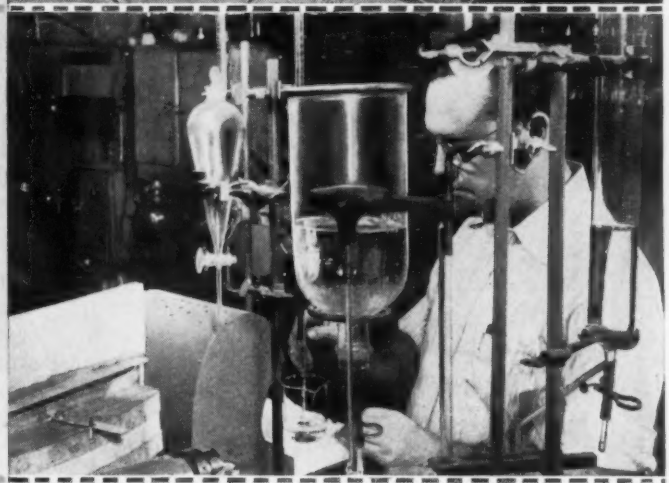

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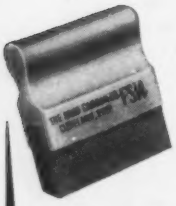

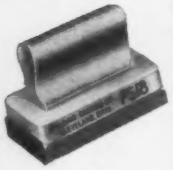

During normal operation, under certain conditions and often caused by improper brush application, a high resistance film forms on commutation and ring surfaces. This film is detrimental to the efficient operation of motors and generators. OHIO Burnishing Tools remove this film and leave a commutator or ring surface clean and glass smooth. There is a style and size of tool for every purpose and for motors from flea to heavy duty horse power. Sold under guarantee of absolute satisfaction.

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THIRD MALAD UNIT IN OPERATION IN IDAHO

A third unit in Idaho Power Co.'s Hagerman Valley development on the Malad River went into operation Oct. 4. Under construction for a year, the plant has a rated capacity of 13,500 kw. It replaces the old Malad River 5,000-kw. plant built in 1910.

This is the third step in postwar hydroelectric development in the valley. A 7,000-kw. installation went into service in June one mile upriver. A 16,500-kw. plant on the Upper Salmon Falls of the Snake River was finished in 1946.

Two larger units are still under construction. A 60,000-kw. power plant is being built on the Lower Salmon Falls, while a 70,000-kw. installation is under way on the Snake River west of Bliss, Idaho. The plant on the Lower Salmon is expected in operation in mid-1949, and the Bliss installation should be ready in 1950, according to company officials.

All are part of a $55,000,000 overall expansion plan to serve both Idaho and Oregon communities.

San Diego Gas & Electric Selects New Plant Site

For future expansion, San Diego Gas & Electric Co. has selected a site 50 miles north of the city where its present two generating plants are located.

Purchase of an 111-acre site south of the town of Carlsbad was announced by Emery D. Sherwin, vice-president of the utility, for what will eventually become the largest generating plant in the company's system.

Proximity to the ocean for cooling water and the central location in one of the country's fastest growing rural areas were factors determining the selection. It may be five years before the first generating unit is installed, but after that all future additions are expected to be made at the Carlsbad location, Sherwin said.

PGE Building Tie to BPA Troutdale Lines

Portland General Electric Co. has started work on an $800,000 transmission system to connect with the Bonneville power lines at Troutdale, Ore., near Portland. The facilities will provide an additonal flow of 180,000 kw. of hydroelectric power into Portland. With six other tie-ins between PGE and BPA lines, combined capacity will be 425 kw.

The new project will include two 57,000-volt circuits supported by 29 steel towers to support lines running from Troutdale to the PGE substation at Ruby Junction east of Portland. From there wooden poles will carry the lines to two substations in Portland.

Canadian Firm Studying Large Plant Development

Development of a large plant proposed by Aluminum Co. of Canada for British Columbia may result in the linking of two northerly water systems in three potential hydro electric development sites.

This was disclosed by McNeely Dubose, Alcan vice-president, as he passed through Vancouver, B. C., recently.

The three power prospects are Chilco Lake, near Bute Inlet; Eutsuk Lake, near Dean Channel, and Tahtsa Lake, adjacent to Gardiner Channel.

By linking Eutsuk Lake and Tahtsa Lake, and bringing Whitesail Lake into the combination, about one and one-half million horsepower can be harnessed, Dubose said.

Big problem, he explained, is lack of suitable level ground at tidewater near the three-lake system for a townsite. "You can't hang a city of 50,000 on the side of a cliff," Dubose remarked.

The combination project would require high dams which would raise water level of Whitesail Lake (elevation 2,694 ft.) and Tahtsa Lake (2,783 ft.) to the level of Eutsuk Lake (2,817 ft.). Preliminary surveys, which cost $125,000, are now complete, and an engineering report will be ready in March. If the second report is favorable, to one site or another, an engineering survey costing $1,000,000 will be made in 1949 and 1950, Dubose said.

Engineering is in charge of International Engineering Co. of San Francisco and Denver.

● CENTRAL HELICOPTERS, INC., Portland, Ore., has received a contract from the Bonneville Power Administration to patrol Bonneville's 3,000 miles of transmission lines. The contract, awarded on a low bid of $30,250 for 550 hours, calls for furnishing machine, maintenance, fuel and oil, and pilot. The entire Bonneville system will be covered. An experimental three-month patrol by helicopter in the spring of 1947 is said to have resulted in the present contract. The system can be covered in 50 hours of flying and the two men aloft can accomplish the work of 36 men on foot.

ANNOUNCING...

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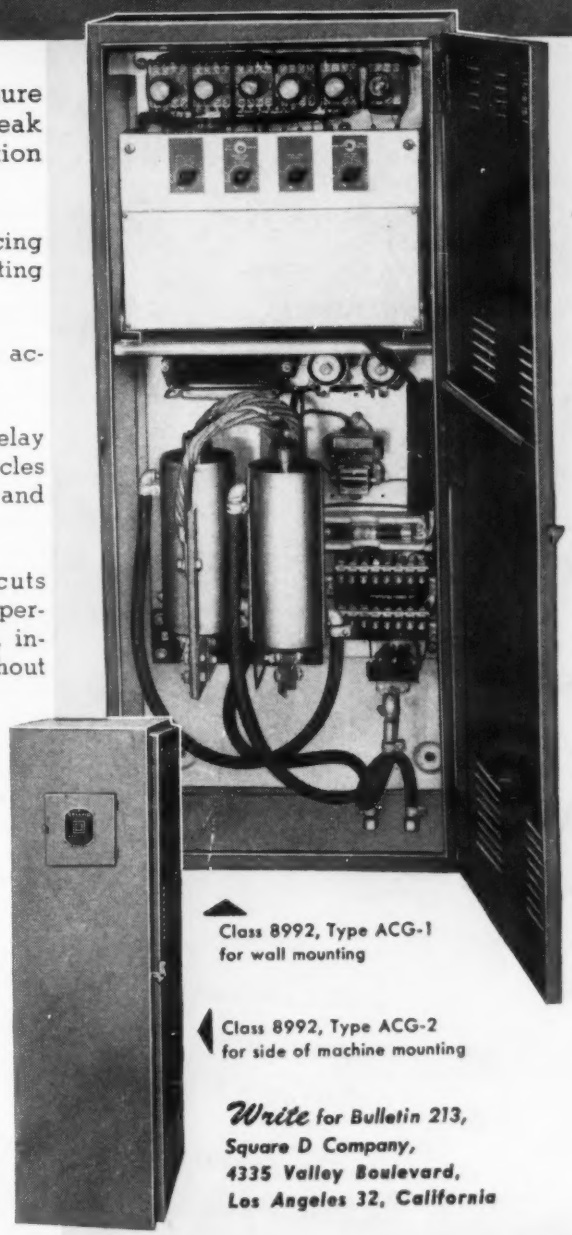

NON-SYNCHRONOUS COMBINATION UNIT . . . one enclosure houses an electronic contactor to make and break power circuit and a timer to govern weld duration and electrode motion.

SPEED • Up to 400 welds per minute. No sequencing relays. Simple six tube circuit cancels out operating delays of valve and firing relays.

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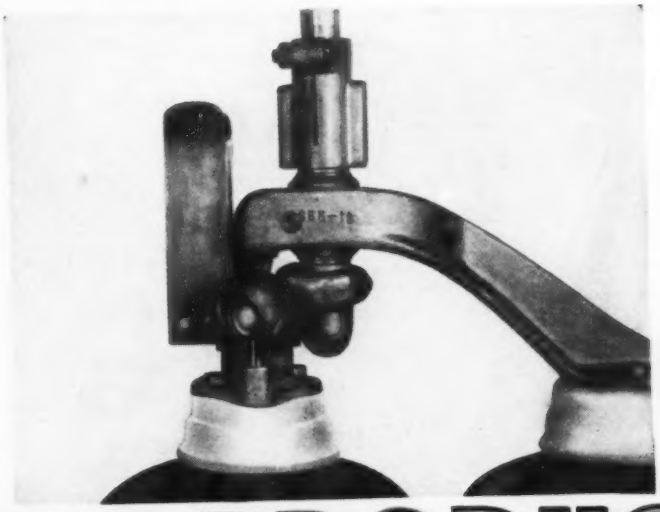

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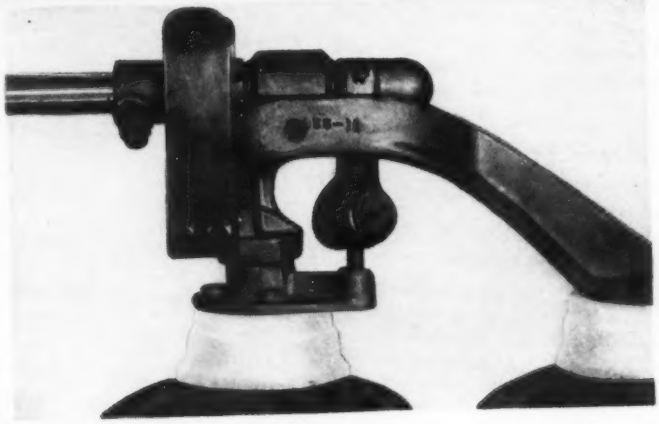
DEPENDABLE PRODUCTS

- Wide Contact Deflection.
- High Mechanical Advantage at Point of Pressure Application.
- Spring-Tempered Beryllium Copper Contacts.



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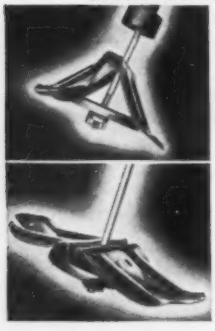

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FOR LITERATURE WRITE

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DETROIT DAM CONTRACTS WILL BE AWARDED

Major contracts for construction of Detroit Dam, unit of the Willamette Basin flood control, power and navigation project in western Oregon, will be awarded next spring, according to Col. O. E. Walsh, Portland district engineer, Corps of Engineers. A construction town is nearing completion at the damsite.

Located on the North Santiam River on the west slope of the Cascade range, the dam will have a rated power installation of 100,000 kw., to be placed at the disposal of the Bonneville Power Administration. It will be an all-concrete, straight-gravity structure, 1,580 ft. long and 448 ft. high, topped by a 20-ft. roadway. Cost is estimated at $58,899,000.

Submarine Cable To Connect British Columbia Projects

A submarine cable will be laid across Okanagan Lake in British Columbia to connect the Peachland-Westbank area with the B. C. Power Commission's new hydro project at Whatshan Lake.

The government has approved an expenditure of $78,800 on the cable, acocrding to Premier Byron Johnson.

It was also announced the commission will take over the electric plant at Chase Village at the west end of Shuswap Lake. The plant is being purchased for $10,927 from Carlin Bros. and the distribution system will be linked to the Kamloops power supply by October 1949.

Arizona Company Issuing Shares to Finance Building

Central Arizona Light & Power Co., Phoenix, Ariz., has received State Corporation Commission approval for issuance of 300,000 shares of common stock to finance partially a $10,000,000 expansion program doubling the present 72,500-kw. capacity of its steam generating plant.

M. O. Best, chairman of the board of directors, said the program calls for installation of 60,000 kw. additional capacity and that construction will be started next year and completed in 1950.

The company currently is constructing an 11,000-kw. addition to its existing plant and recently put into operation a 30,000-kw. unit.

The stock issue has been underwritten at $10.25 a share to be resold to the public for $11.

In addition to its plant expansion, Central Arizona plans to spend another $13,000,000 in the next three years on modernization and extension of its electric and natural gas systems.

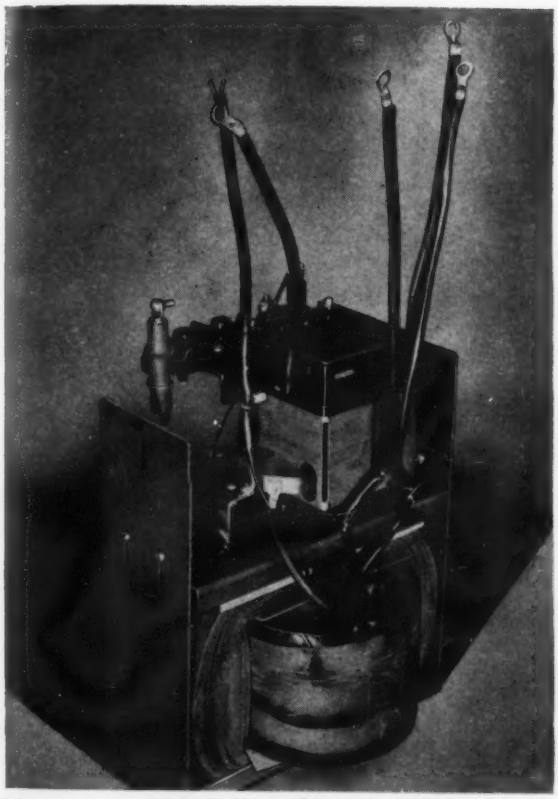
● APPLICATION of the West Kootenay Power and Light Co. Ltd. and the Consolidated Mining and Smelting Co. Ltd. for permission to store two additional feet of water in Kootenay Lake has been opposed by the Reclamation Farmers' Assn. and the Kootenay Valley Power and Development Co. West Kootenay Power and Light and Consolidated Mining and Smelting ask this permission to augment storage already authorized by an order of approval issued in 1938. The application was heard by the International Joint Commission.

● SALE of a $500,000 third supplemental indenture of a $100,000,000 bond issue authorized in 1947 has been granted the Citizens Utilities Co. of Nogales. The company now has issued $4,500,000 worth of bonds in financing improvements and expansion of the system in southern Arizona. The new indenture will be used for construction of a 3,600-kw. generating plant and conversion of the utility's gas system from manufactured to natural gas.

● SALE by the Arizona Edison Co. of $1,500,000 in 4% sinking fund debentures has been approved by the Arizona Corporation Commission. The sale will be to the Banker's Life Insurance Co. of Des Moines; the Employer's Mutual Insurance Co., Wisconsin, and the Aid Association for Lutherans, also of Wisconsin. To be used to retire outstanding bank loans and finance expansion, the debentures will become due June 1, 1968.

● CLARK COUNTY PUD, Vancouver, Wash., plans a $1,200,000 expansion program next year. More than half of the program will be financed by issuance of bonds. Recent annexation of Pacific Power & Light Co. properties in the county will give the PUD an estimated net income of $335,019 on gross revenue of $2,710,713 from 2,700 customers.

● SEATTLE CITY COUNCIL has authorized the sale to Blyth & Co. and associates of the second $6,000,000 unit of a $36,000,000 City Light revenue bond issue. The syndicate bid $5,807,280 for 2¾% bonds, making the effective interest rate 2.925%, W. C. Thomas, city comptroller, said. Its bid was the highest and best of six.



This interior view of the Kuhlman 5kva, 4160-120/240 volt, single phase, Oil Immersed Self Cooled distribution transformer shows secondary breaker, protective links, and BI Core Construction. Secondary breaker mechanism normally closes a signal lamp circuit at a coil temperature of 105° C, and trips the breaker at 125° C. Protective links between primary winding and each line terminal disconnect the transformer from the line in the event of transformer failure. BI Core Construction, introduced by Kuhlman, pioneered use of low loss steel in distribution transformers. Leads are insulated and protected by Natvar 400 Extruded Vinyl Tubing.

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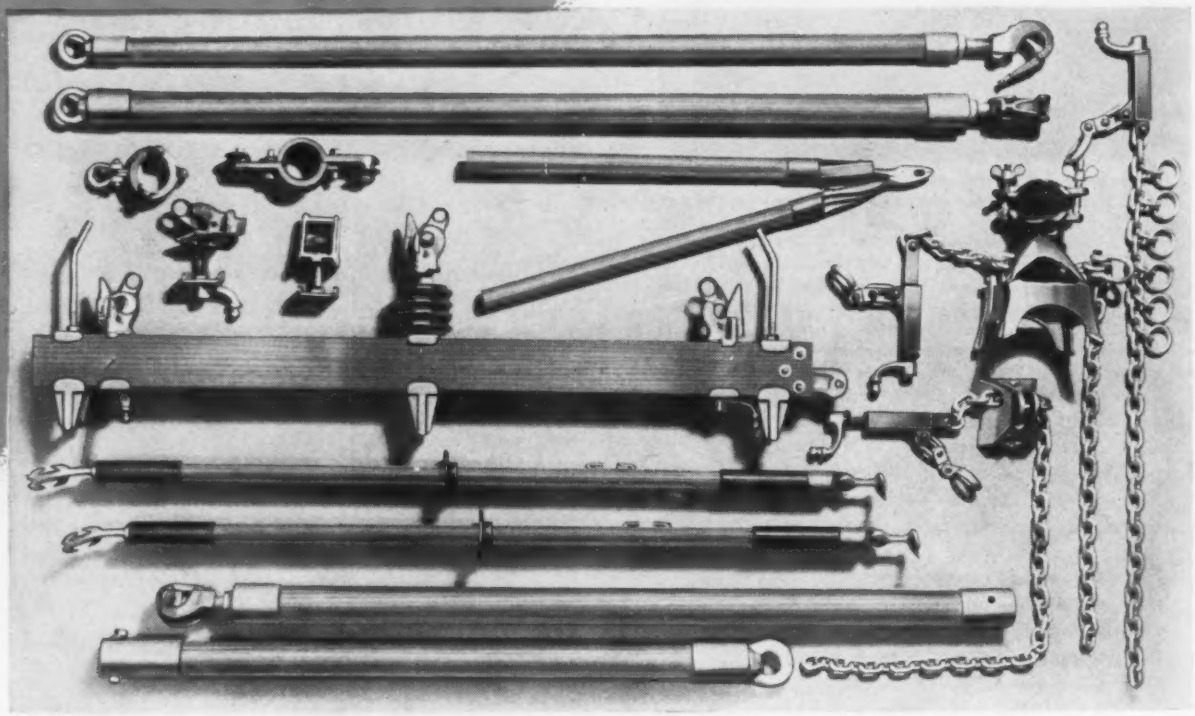

Here's What You Get in the Kearney Rural Line Tool Set No. 4778-3, which is shown above:

1 Chain rope hitch • 2 Pol-Grips 1.25′ to 3″ • 2 Pol-Grip extensions • 2 Lift-Pol snubs • 2 Fit-on tie heads • 1 Insulated pliers 1.25″ x 5′, oak • 1 Lift-Pol, 2″ x 10′ • 1 Han-Pol, 1.5″ x 10′ • 2 Combination tie sticks • 1 Lift-Pol, 2.5″ x 16′, spliced • 1 Side arm, 9′ long, less fittings • 1 Insulator conductor holder assembly • 1 Side Arm attachment • 1 Brace bracket assembly • 4 Conductor holders • 1 Pol-Band, 2.5″ • 2 Line guard assemblies.

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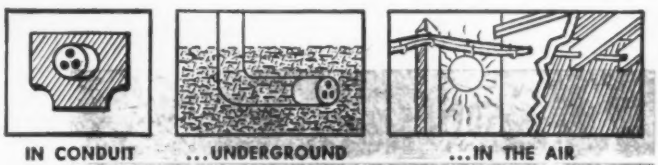

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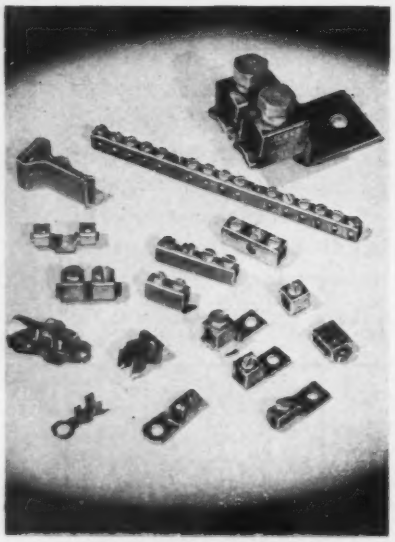

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NAVY STEAM GENERATOR RETURNED TO MARE ISLAND

The mobile U. S. Navy steam generator used by the Salt River Valley Water Users at Tempe, Ariz., to generate emergency power has been deactivated and returned to Mare Island, Calif.

The $2,000,000 unit was sent to central Arizona in June 1946 to help meet power demands during the drought. The Water Users have paid more than $625,000 in rent. From June 1, 1946, until Nov. 15, 1947, rental was $100 a day; after that, $314 a day.

R. D. Searles, president of the Water Users, said arrangements have been made to replace power generated by the steam unit with additional purchases from the Bureau of Reclamation. He said this will carry the association until additional generating units are installed at the Tempe plant.

The association had sought an extension of its lease for the Navy plant until June 1, 1949. Searles said, however, that conditions set up by the Navy made continued use prohibitive.

New Trial Denied in Condemnation Suit

Motion of the Stevens County PUD of Colville, Wash., for a new trial of its condemnation suit against the Washington Water Power Co. has been denied by Superior Judge B. B. Horrigan.

The PUD asked for a new trial on grounds of jury misconduct and because of an "excessive and unjust" award by the jury, which had fixed the price of the power company's property in the county at $2,500,000.

Judge Horrigan said he could find no evidence of willful neglect or misconduct on the part of the jurors. As to the price they fixed, he pointed out that they "accepted figures that were within the evidence given by competent men and it was in their province to do so."

● To DOCUMENT its progress and prospects, Seattle City Light has awarded a contract for production of a 30-minute color film with sound track. Tentatively titled *Power for Progress*, the film will feature City Light's three Skagit River plants, Gorge, Diablo and Ross.

● WAGES of journeymen electricians at Spokane have been increased 7c an hour and will be further increased 6c Jan. 1, union leaders there have announced.

TACOMA DOES GOOD JOB ON ELECTRIC CODE

An exceptionally considerate job of preparing and explaining its 1948 electrical code has been done by the City of Tacoma. Just published, it is unique in several respects.

The new ordinance, No. 13443, was passed Aug. 25, 1948. W. L. Gaffney, chief electrical inspector explains in a preface that the code is in three parts, first, administrative provisions, second, the city utility's requirements and third, the supplements to the National Electrical Code, which is used as its basis.

In the utility provisions all neon, mercury-vapor, fluorescent or other gaseous tube lighting and welding transformers, X-ray machines or other low power factor equipment, excepting portable equipment of less than 300 kva. rating, must have power factor corrected to within 90% lagging. Another section prohibits any and all kinds of electric fence.

Supplementary rules to the NE code limit appliances to 1,650 watts on 110-volt circuits, require 208, 240 or 480 for any in excess; sets No. 12 as minimum size conductor for heater circuits; minimum breakers on water heaters 25 amp.; requires a 15-amp. branch circuit for furnace unit; designates any unfinished attic reached by a stairway as living area and included in calculation of load; sets a range minimum of 8 kw.; requires neutrals to be same size as current carrying conductors; requires metal raceway for service conductors on outside of building; requires three No. 4 service conductors on permanent single or two family dwellings; requires range frames grounded to the grounded circuit conductor; requires raceway for all wiring in fire districts 1 and 2; permits knob and tube only in stores, sheds, single and duplex family dwellings outside of the fire zones; requires a range outlet box with 50-amp. receptacle and three-conductor cable and cap rated at 50 amp.; water heaters controlled both by a thermostat and switch, or cap and receptacle. The Type S fuse is made mandatory in the code.

Eliminated from acceptance are NE Code provisions for uninsulated neutral, armored cable, nonmetallic sheathed cable, service entrance cable, nonmetallic surface extensions and underplaster extensions.

An exception is made in wiring permitted for spray rooms wired in conduit where the operator limits spraying to 15 seconds in any two-hour period. Otherwise the rigid Article 500 rules apply. But this code does a unique thing. It ends with two pages of explanation why certain things are done. For example it notes the incompleteness of section 2124-b of the NE Code requiring a three-pole grounding receptacle for the laundry location without having provided that washing machines be grounded. It tells why service conduit without fuse protection ahead of it is hazardous if hidden in wall spaces. It then discusses spray booth dangers and suggests a consultation with inspector and fire marshall before installation is started.

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FAST! EFFICIENT! ECONOMICAL!
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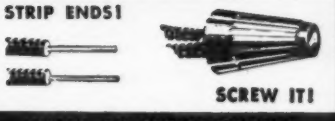
SCREW IT!
THAT'S ALL WITH SCRU-ITS!
WRITE FOR DATA SHEET NO. 1026
SOLAR ELECTRIC CORPORATION
WARREN, PA.

Why the Finish Stays Put
ON EVERY *Gardner* TRANSFORMER

Blasting with steel shot removes all scale and oxides—surface-grains the tank so that the metal forms a tight bond with the bake enamel. Two coats, sprayed on and slowly oven dried, give the Gardner Transformer a finish that defies the most violent extremes of heat and cold.

Gardner Electric Mfg. Co.
EMERYVILLE 8 CALIFORNIA

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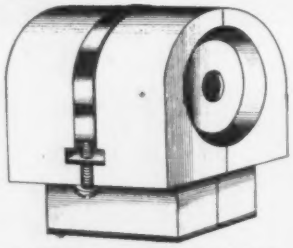
GARDNER TRANSFORMERS GUARD PROFITS

KULKA a great name in electrical wiring devices

FLUORESCENT SLIMLINE LAMPHOLDERS

SLIMLINE

560—(FULL SIZE) Rated for 1000 volts 660 Watts. SINGLE TERMINAL CONNECTION. FOR SLIMLINE
561—Rated for 250 volts 660 watts TWO TERMINAL CONNECTIONS. FOR SLIMLINE
562—Rated for 1000 Volts 660 watts. SINGLE TERMINAL CONNECTION. FOR COLD CATHODE
563—Rated for 250 Volts 660 watts. TWO TERMINAL CONNECTIONS. FOR COLD CATHODE



Here is instant starting without starters. . . . They also will hold other specialty lamps with same bases. Used in pairs with a holder each for the primary and secondary ends. Each unit has separate circuit assuring absolute safety. Corrosion is prevented by spot welding at electrical connections. Made of white urea plastic.

SHOW CASE TYPE

CAT. NO. 564
CAT. NO. 565
FOR T-6 (¾" DIAM.) SLIMLINE, COLD CATHODE and GERMICIDAL LAMPS

Compact and rugged are but two of the qualities of these little units used widely for show cases, cove lighting, etc.

Operate in pairs on the PUSH-PULL principle of lamp insertion and removal.
Supplied with No. 18 1000 volts Plastic lead wires of specified length eliminating wiring. Each holder threaded for two 6-32 fastening screws provided.

PERFECT FOR USE WITH NEW SLIMLINE TYPE OF GERMICIDAL LAMP. Openings for T-6 Slimline or T-6 Cold Cathode. Tube ejector fibre stamping at no additional cost.

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30 SOUTH ST., MT. VERNON, N. Y.

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

Complete POWER DISTRIBUTION SYSTEM at Kearns, Utah

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Consists of:
170 Transformers
300 Primary Cutouts
650 Poles
900 Crossarms
200 Street lighting Units
and all appurtenances.
INQUIRIES INVITED

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USBR LAYOFF AFFECTS MANY JOBS IN WEST

Jobs of 2,882 Bureau of Reclamation employees have been abolished to comply with budget limitations imposed by Congress, Reclamation Commissioner Michael Straus reported. (ELECTRICAL WEST, October, p. 142.)

Personnel of all but one regional office of the bureau are being dismissed, with only a few slated for transfers to other offices which are understaffed, Straus told a group of newsmen. The dismissals will continue until January, he indicated.

Straus said the general lay-off was necessitated by the $48,000,000 ceiling set by Congress for the over-all Reclamation Bureau pay roll for fiscal 1949. A committee of bureau officials studied the employee rolls of the several Reclamation offices, eliminating jobs under each to spread the dismissals with "the least possible affect" on project operations.

The Washington, D. C., office was not affected, Straus said, because its staff underwent a 30% reduction last year. Nor were any Reclamation Region IV personnel removed, since the region, which has headquarters at Salt Lake City, already was understaffed, Straus explained.

Both classified (career workers with Civil Service ratings) and unclassified workers have been affected in the personnel shift. The unclassified employees, including per diem and force account workers, were particularly vulnerable since their work could be farmed out to private contractors in most cases. Regional offices, their headquarters' locations and the number of employees affected follow:

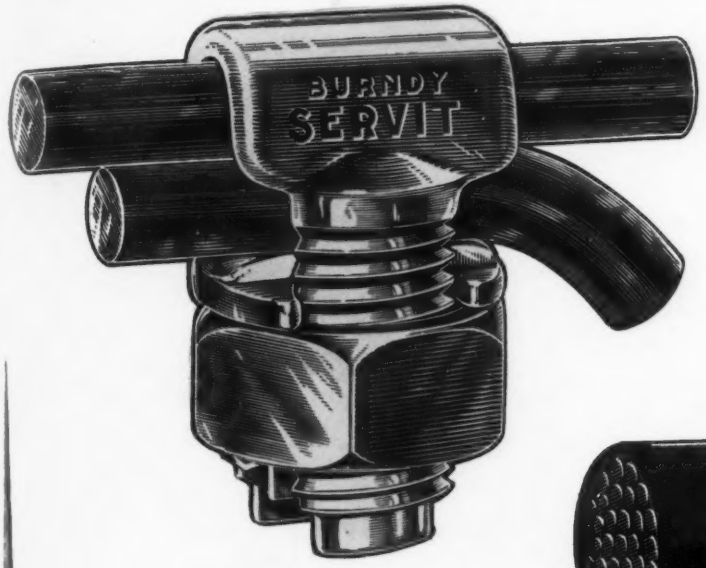
Region I, Boise, 429; Region II, Sacramento, 1,114; Region III, Boulder City, 285; Region V, Amarillo, 99; Region VI, Billings, 533; Region VII, Denver, 202; Denver engineering office, 220.

Straus estimated that scheduled dismissals would bring the bureau's pay roll within one per cent of the $48,000,000 ceiling. Bureau personnel will be within the limitation by January, he added.

The bureau's expenditures for personnel services totaled approximately $51,000,000 last year. In its budget estimates, the agency asked Congress for some $57,000,000 for salary payments during the current fiscal year, Straus said.

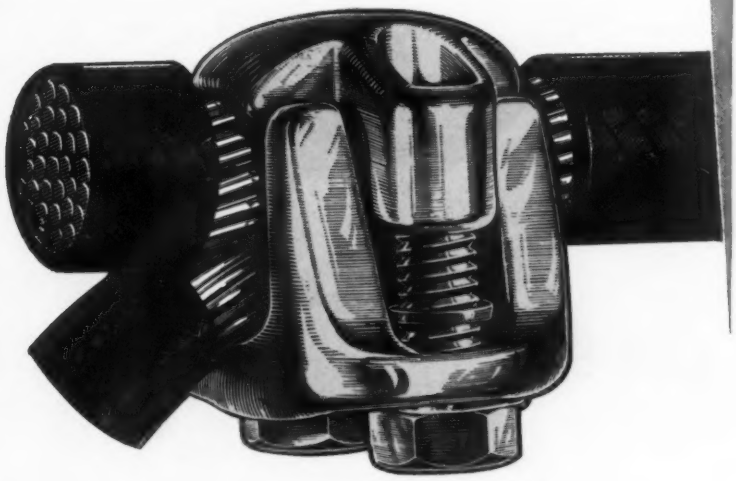
● TRICO ELECTRIC Cooperative, Tucson, Ariz., has been granted a $902,000 loan by REA. T. H. Blair, Trico president, said the money will be used for a 5,000-kw. generating plant.

The *Leaders* in SERVICE CONNECTORS



Servit

—8 sizes for cables from #10 to 4/0



Oklip

—6 sizes for cables from 2/0 to 1000 Mcm.

BOTH LISTED UNDER REEXAMINATION SERVICE UL UNDERWRITERS' LABORATORIES, INC. OF APPROVED

These two popular Burndy service connectors *lead all others* by a wide margin at the point of sale, for the following reasons:

- *all sizes indicated are UL approved*
- *rounded corners and compactness make taping easy*
- *each size accommodates a wide range of conductor sizes*
- *both have the high strength and high conductivity found in all connectors of Burndy manufacture*

A free copy of the Burndy "SERVIT SELECTOR," convenient for selecting the right service connector, is yours for the asking.

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WESTERN BRANCH: Vernon 11, California • CANADA: Canadian Line Materials, Ltd., Toronto 13
FOREIGN: Philips Export Corp., New York 17, N. Y.

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stop!

see what Locke's got . . .

Look to Locke for the new ideas

—→ new production methods and facilities

to give you more and better insulators... faster!

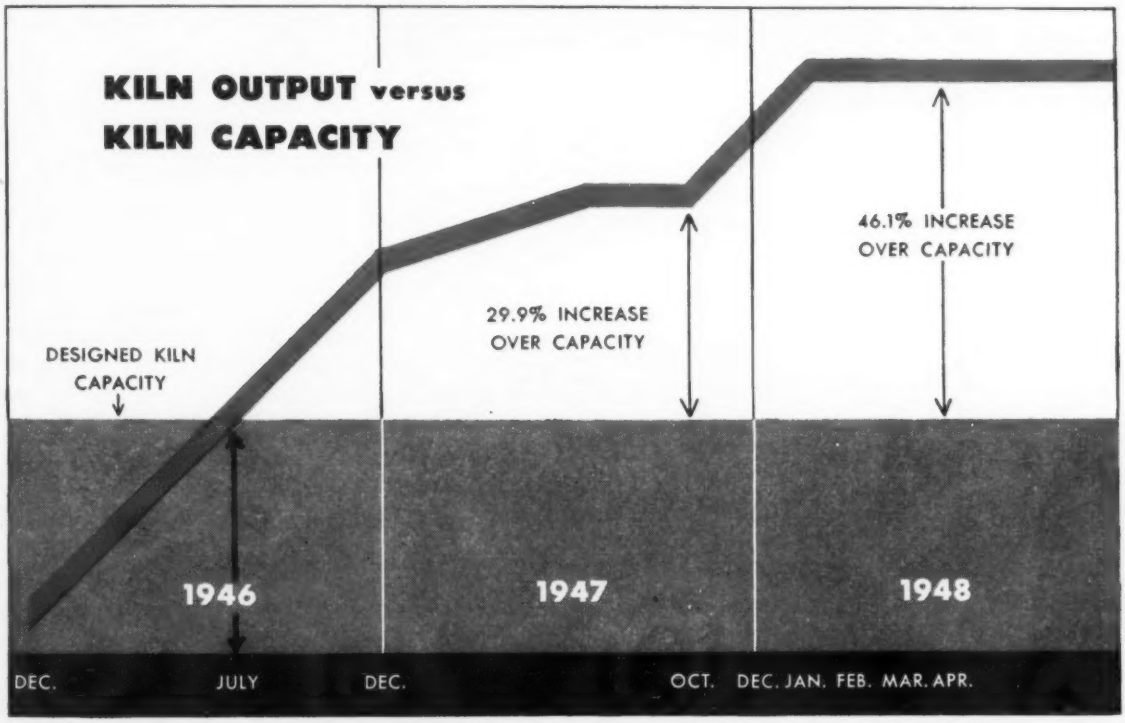
You need more insulators . . . and you need them fast. We're making every effort to see that you get them. Keeping you supplied with all the insulators you need is an obligation and a responsibility which we gladly accept.

To fulfill this responsibility we have made big investments in time, money and effort.

We have modernized and expanded our facilities with the result that our current output now exceeds our pre-war level by 220%.

Naturally, to meet your demands for insulators, there's still lots more for us to do. But we want you to know that tangible progress is being made . . . and that you'll be receiving more and better insulators . . . perhaps faster than you expect!

Remember, for the finest in insulators . . . always see your nearby Locke distributor first.



...before you buy...stop!
see what Locke's got

TO INCREASE OUTPUT 220% we took many steps. For example, take the case of kiln output vs. actual *designed* kiln capacity, see graph above. By employing new methods and procedures we have increased output *over* designed capacity by 46.1% since July, 1946—with 16.2% of this increase coming within the last year! Certainly this indicates that we're making every effort to bring you more insulators, faster . . . and that we're sparing no expense to do so.

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55 YEARS EXPERIENCE IN HARDWARE AND INSULATORS

Swedish power experts recently visited the Merwin project of Pacific Power & Light Co. From left, A. Ohman, F. Wahlgren, Y. V. Holm, Carl Lundell, city electrical engineer of Portland, and P. Wilh Werner, with O. L. LeFever, assistant chief engineer for Pacific, pointing out development work now in progress at the dam. Holm is president and Ohman and Wahlgren are chief engineers for the Krangede Power Co., and Werner is consulting engineer for VBB, a Swedish power commission. The group visited other Western installations

Swedish Power Experts Visit in Northwest

Four Swedish power experts recently inspected the Merwin hydroelectric project of Pacific Power & Light Co. The men were in the United States in October on a five-week tour of power projects to gather information for a system of dams being planned for their country.

Representing the Krangede Power Co. were Y. V. Holm, president, and A. Ohman and F. Wahlgren, chief engineers. With them on the tour was P. Wilh Werner. a consulting engineer for Vattenbyggnadsbyran, an operating power commission commonly referred to as "VBB."

The power engineers have visited a number of major power developments in the East. Midwest and Western states.

Holm explained that power problems in Sweden are about the same as in the United States, but on a smaller scale. Average use of electricity is about 2,000 kwh. per person in Sweden, which compares favorably with the United States.

Future construction of power dams by the Krangede company will utilize the latest techniques in dam construction studied by the engineers in the U. S. tour.

Utah Power & Light Co. Holds Leader Conferences

Two hundred and forty of Utah Power & Light Co.'s supervisory personnel in all departments are learning how to be better bosses. They are attending group conferences, 12 to 15 in a group with a conference leader, and on company time, for a two-hour session, seeking to become better leaders. The National Foremans' Institute manual is used as a vehicle for the course but it is adapted to the company's own problems.

Leaders for the conference were given training first under direction of Parley P. Holton, assistant personnel manager to Col. L. W. Nims. As the work continues it is planned to change leaders also in order to develop new leaders and to give the widest base possible to the exchange of ideas and information.

The first art of getting along with people, of leadership, will be the main object. Also the company's policies will be reviewed so that all who have charge of others will be familiar with these policies and can explain them. The conferences will also discuss the enterprise system as a part of the complete operation. Supervisory people's own problems will be brought in for advice and help from others who have handled similar problems before. Fault corrections, more efficiency, better feeling and teamwork will be aims of the program, according to Dr. Adam Bennion, vice-president in charge of personnel.

Labor Trouble Brings Resignation in B. C.

Harry Blakeborough has resigned as superintendent of public utilities for the city of Kelowna, B. C., because "labor conditions leave me no option."

Blakeborough was city engineer for 40 years prior to his retirement at the first of the year and his re-engagement for reconstruction of the electrical system.

He informed the city: "The attitude of union employees in the electrical department is such that I have no control as to what the men shall do, or the wages they shall receive according to their qualifications, and some men are now receiving remuneration for positions they are supposed to fill, but have not the qualifications to fill..."

"Relation between the men and myself have reached a stage where it is impossible to carry on my duties any longer."

Electrical workers recently asked for a cost of living bonus. Two weeks later, they wrote the city a second time stating that in view of council's silence they felt free to accept positions elsewhere if offered. The letter was referred to union headquarters at Vancouver.

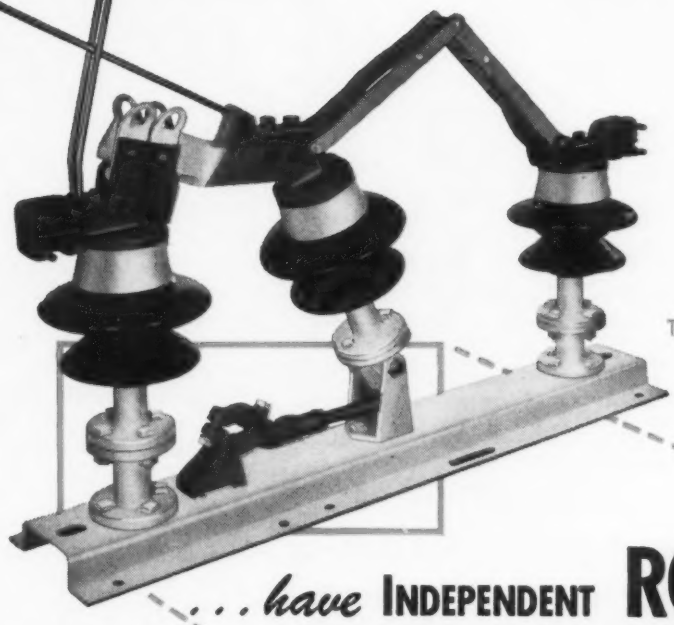
Municipal System Sale Approved by Ballot

Sale of the municipally owned electric distribution system at Courtenay, B. C., was approved by ballot, and the system will be taken over by the B. C. Power Commission on April 1, 1949. Agreed price is $275,828, to be paid at the rate of $18,000 per year with interest of 3% included in the payment.

Bridge River Plant On Line in October

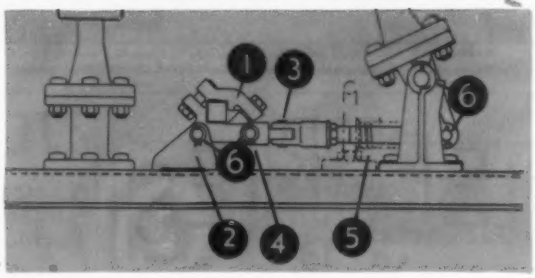
B. C. Electric's Bridge River plant was opened officially on Oct. 23, with energizing of the new 62,000-hp. unit.

CHANCE TYPE WN-VN Switches



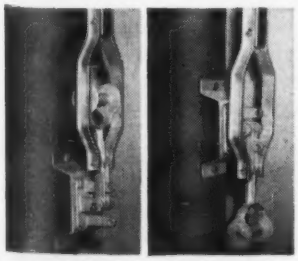
TYPE-WN

. . . have INDEPENDENT ROCKERSHAFT

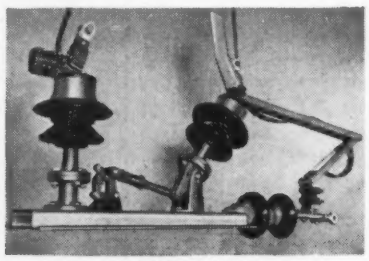


. . . and all these IMPORTANT FEATURES

- **POSITIVELY NO SLAMMING . . .** Chance WN or VN switches cannot be slammed closed because a special toggle joint (4) arrests the downward movement of the contact blade. Over-travel reverses direction.
- **EXTRA OPERATING LEVERAGE . . .** The Rockershaft design gives extra leverage for smooth, easy operation. This, plus action of the toggle joint, gives ample power to break ice accumulations with only moderate effort. Bumper spring (5) cushions operating movement of tilting insulator, boosts closing motion.
- **UNIFORM CONTACTS—ALL PHASES . . .** The Rockershaft mechanism operates independently of the tilting insulator making positive contact on all phases. Mechanism is on dead center when blades are closed. Effect of distortion of control shaft is negligible, each blade in three pole switch making complete contact without affecting the other two blades. Blades and clips are silver plated, clips self aligning.



SPADE TYPE HANDLE



TYPE-VN

Plus

- **UNIVERSAL TERMINALS . . .** Terminal clamp cap may be reversed to accommodate smaller conductors. Range: No. 4 solid copper up to 600M C. M. cable or ½" and ¾" I. P. S. tubing.
- **SIMPLIFIED INSTALLATION AND ALIGNMENT . . .** Removable clamp (1) permits the operating shaft to be laid in position after switch units are mounted. No threading required. Rockershaft base (2) may be turned to aid alignment with operating shaft. This base and Universal joint (3) help compensate for cross arm warpage after installation.
- **NO OILING—SMOOTH PERFORMANCE . . .** All working joints fitted with Oilite bearings (6). Smooth operation, no field maintenance.

C481

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When you are installing or re-arranging—and need a special transformer to exactly match your requirements call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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Tubings: Varnished, Saturated, Extruded
Twine: Seine, Marlin, Armature, Waxed
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WAGE LEVELS ON COAST TOP LIST IN SURVEY

Pacific Coast wage levels for electric utility workers topped all other sections of the country in a survey recently released by the Bureau of Labor Statistics. Pacific Coast rate for average straight-time hourly earnings was $1.64, as compared with a U. S. average of $1.35. The Mountain region figure was $1.37. The Southeast was lowest, with $1.17.

The survey, made in March and April and released last month, covers 130 Class A and B privately operated electric utilities with more than 100 employees. Here are some of the disclosures as to earnings and supplementary economic benefits of the 161,000 plant and 33,000 office workers surveyed.

Wages—Straight-time wage rates for plant workers averaged 1.35 an hour (Average for manufacturing employees at the time was $1.29). Only one out of eight earned less than $1; one-third earned $1.50 or more. In the office, most of the men are general clerks, which jobs averaged 1.28.

Rate structures—123 of the companies have formal rate structures which fix job rates in advance. About half of them use single rates and the others use ranges within which individual workers may get wage adjustments based on merit, length of service or some other factor.

Work week—40-hour week was most common.

Work shifts—All but five companies have three or more shifts. Extra-shift employment is small, with only 9% of the workers on a second shift and 8% on a third or other shift.

Shift premiums—About 46% grant extra pay for work outside the day shift, usually in extra cents per hour. In most companies, it is less than 5c on the second shift and between 5 and 10c on other shifts.

Vacation with pay—They are customary for plant and office workers.

Paid holidays—Only a few companies do not give pay for holidays not worked.

Insurance or pension plans—All but a few companies have at least one type of insurance or pension plan.

Paid sick leave—A majority grant sick leave with pay on a formal basis.

Bonuses—About 15% pay non-production bonuses.

Highest paid group are load dispatchers, with an average of $2.16 per hour in the Pacific region and $1.94 in the U. S. Journeymen linemen averaged $1.87, Pacific, and $1.61, U. S. Groundmen averaged $1.38, Pacific, 1.07, U. S. Averages do not include premiums for overtime or night work.

NEWS ABOUT PEOPLE

● GEORGE R. PROUT, vice-president of General Electric and general manager of its air conditioning department, has been appointed an assistant general manager of the G-E nucleonics department at the Hanford Atomic Energy Works near Richland, Wash., effective Nov. 1. He will become general manager Jan. 1, succeeding Roy C. Muir, who will continue as a consultant. With the company since 1920, Prout has been with the air conditioning department since 1944, as general manager since 1945.

● WALTER V. WESTOVER, Portland, has been made chief accountant for the Clark County (Wash.) PUD, succeeding Guy Burch, who resigned during a recent shakeup in the organization. Westover formerly was with the West Coast Power Co. and Bonneville Power Administration.

● MARGARET WERNER has been appointed home economist for the San Diego Gas and Electric Co., and will conduct cooking schools and dealer demonstrations in the San Diego area.

● APPOINTMENT of E. B. BREMER as electrification manager of the Northwestern district for Westinghouse Electric Corp. has been announced by Fred T. Whiting, vice-president.

● E. L. FUNK, formerly with Graybar Electric Co. in Salt Lake City, has been promoted to the position of manager of the supply and specialty sales for Graybar in New York City.

● FREDERICK E. COOPER of Oakland has been appointed Precipitron specialist for the Pacific Coast district, Westinghouse Electric Corp., with headquarters in San Francisco.

● ALAN G. PAINE, chief legal counsel for the Washington Water Power Co., has been elected to the board of directors for the company.

● H. H. PRINCEHOUSE SR. has been named manager of the new Lincoln Electric store in Tacoma, Wash., according to the owner, A. L. Ricono.

● ROBERT NORDYKE, line superintendent for Salem (Ore.) Electric, has been named manager of the cooperative to succeed Harry B. Read, deceased.

More Efficient Lighting *with* ABolite

DUO-MOVE SYSTEM OF MAINTENANCE

QUICK REPLACEMENT — EASY TO CLEAN — SAVES TIME & LABOR

ABolite DUO-MOVE type reflectors consist of a hood with separable socket which remains permanently attached to the conduit. The lower member of socket is attached to metal collar at top of reflector neck. This permits reflector and lamp to be taken down as a unit. With the Duo-Move Changer, maintenance is so easy and quickly accomplished you can always have clean reflectors and bright, efficient lighting. DUO-MOVE and separable socket type reflectors are available in RLM standard dome, shallow dome, deep bowl and mercury vapor types. ABolite Reflectors are sold exclusively through electrical wholesalers.

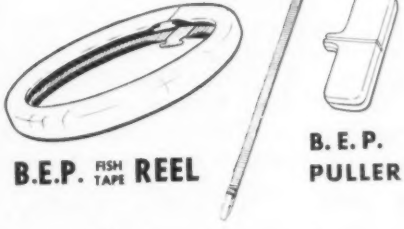
Light right with ABolite REFLECTORS PORCELAIN ON STEEL

THE JONES METAL PRODUCTS CO., West Lafayette, Ohio

MODERN TOOLS FOR ELECTRICIANS

B.E.P. means fine tools for electricians. The B.E.P. REEL, a real time-saver, reels the tape in, and out, fast!! The B.E.P. fish tape PULLER makes a hard pull easy, or instantly reverses to be used as a *pusher*. N.E. BEND SNAKE LEADER steers the tape smoothly around any bend; can be tucked into Reel when not in use.

N·E·BEND Snake LEADER



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B. E. P. PULLER

Order from your regular wholesaler or distributor

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Powder-Packed

RENEWABLE FUSES

GIVE YOU
BETTER PERFORMANCE . . .
LONGER SERVICE . . .
DEPENDABLE PROTECTION

Here's Why:

- "POWDER-PACKING" protects link against bending, twisting, fractures and gives support against sagging, stretching, thinning out . . . RESULT: Less Fuse Blowings.
- "POWDER-PACKING" chokes arc and hot flashes, absorbs explosive pressures . . . RESULT: No fire and accident hazards or damage to fuse casings. Cleaning and scraping eliminated.
- "POWDER-PACKING" acts as a heat insulator, absorbs heat and provides an effective barrier or baffle . . . RESULT: TRICO Fuses operate cooler and GIVE THREE TIMES THE SERVICE.
- "POWDER-PACKING" prevents tampering and link interchanging. Only TRICO custom-built element can be inserted. RESULT: No doubling-up dangers . . . no mistakes . . . no needless blowings . . . no fire hazards.

Get The Facts...Write For

BOOKLET 206-A

It's interesting . . . informative . . . profusely illustrated . . . It tells how you too can get maximum returns from your fuse investment.

TRICO FUSE MFG. CO. Milwaukee, Wis.

● California Public Utilities Commission has announced that Robert P. O'Brien has been appointed supervising engineer on the general staff of the department, and will be responsible for specific special departmental assignments. Lewis R. Knerr has been named electrical engineer in charge of the activities of the electric division, succeeding O'Brien, and Chesley Ferguson has been appointed valuation engineer in charge of the activities of the valuation division.

● Roy McGandy, former manager of the Chehalis, Wash., office of Puget Sound Power & Light Co., has been moved to Olympia, Wash., as assistant manager of the company's southern district. Puget Sound properties in Chehalis and elsewhere in Lewis County were recently purchased by the Lewis County PUD.

● Ralph R. Easter, for 25 years manager of the Tualatin Valley division of Portland General Electric Co., has been appointed assistant to the chairman of the board of the company. John Enschede, assistant manager of the Tualatin Valley division, has been advanced to manager.

● William K. Billow, formerly with Bonneville Power Administration, has been appointed operating superintendent of the Clark County PUD at Vancouver, Wash. He succeeds Hugh Whisler, who was recently dismissed.

● A. L. Stone, Stone Electrical Supply Co., Los Angeles electrical contractor-dealer, has been re-elected treasurer of the Construction Industries Exposition and Home Show of Southern California. Earl T. Heitschmidt, architect, was elected its president.

● William W. Bracken has been named field supervisor in S&M Lamp Co.'s floodlight division.

Bracken

● Three Promotions have been announced by the Washington Water Power Co. J. Harry Lucas, Moscow district manager since 1944, has been named to fill the Lewiston division manager position vacated by the death of Grover Beckman. Victor S. Casebolt, Colfax district manager since 1936, became the successor to Lucas at Moscow, and John R. Black has been appointed to take over the Colfax district.

● Victoria Businessmen recently held a testimonial dinner at the Empress Hotel in Victoria, B. C., in honor of W. C. Mainwaring, Vancouver Island vice-president of B. C. Electric Railway Co., who has taken over other duties for the company at its Vancouver head office. The dinner was also a welcome to E. W. Arnott who succeeds Mainwaring as vice-president for Vancouver Island operations.

● Charles K. Krolek is the new district representative in charge of the Western district who has been appointed to supervise the television service organization of the Magnavox Co. Krolek was formerly service engineer in the X-ray Division of Westinghouse Electric Corp., San Francisco. His territory will include the region west of the Rocky Mountains.

● Crown Electric Co., an old-time electrical contracting business in San Francisco, is being taken over by William Powell and Lou H. Spott of Spott Electric Co., Oakland, as a San Francisco subsidiary. Spott Electric, among other things, specializes in cold-cathode lighting installations under its own trade name, Cathon.

● J. A. Clay, former vice-president and general manager of Western Colorado Power Co. and more recently an executive of Utah Power & Light Co., has been named a member of a 12-man mission to coordinate the operations of Korean electric power systems. He will be in Korea for the next year.

● Appointment of Francis S. Howard to the position of division vice-president, Southern sales division for Columbia Steel Co., San Francisco, has been announced. Howard will maintain headquarters in Los Angeles.

● Alfred May, commercial manager of the San Diego Gas & Electric Co., retired recently after 37 years with the organization. He was appointed to his present position in 1932.

● J. T. "Dick" Johnson of General Electric Co., Los Angeles, is now executive assistant to the manager of the company.

Willis

● Don Willis, sales promotion and advertising manager of Central Arizona Light & Power Co., Phoenix, has taken over duties of general sales manager for the company, replacing Milton G. Sanders, vice-president in charge of sales. Willis has done advertising and sales promotion for the utility for 18 years, starting as a window display artist. Sanders, PCEA president in 1946-47, resigned to join the Bob Bale Institute of Personal Development.

Deaths

● Will H. Davie, who only July 1 retired as president and became chairman of the board of Allied Industries, electrical manufacturers' representatives of Los Angeles, San Francisco and Seattle, died of heart attack, Oct. 8, aged 78. He was born in Columbus, Ind., came to Los Angeles in 1924 to become Los Angeles district manager of Allied Industries. In 1935 he was made its president. He was a member of the Electric Club of Los Angeles and active in industry affairs on the entire coast.

● Victor Lemoge, one of San Francisco's most colorful pioneer contractors, died suddenly of heart failure, Sept. 29. Mr. Lemoge had been active in the San Francisco Electrical Contractors Assn. all his life, several times holding offices in it, and last year was named vice-president again. His business of late has been handled more and more by his son, Fay Lemoge, who is carrying it on now.

● George Wilfred Johnson, 67, electrical engineer of Seattle, died there Oct. 7.

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NOTES ON THE TRADE

Columbia Steel Opens New Plant in West

Some 2,500 persons attended dedication ceremonies for Columbia Steel Co.'s new sheet and tin plate mill at Pittsburg, Calif., on Oct. 21. In the West for the dedication were Benjamin F. Fairless, president U. S. Steel Corp., Irving S. Olds, chairman of the Board, U. S. Steel, Enders M. Voorhees, chairman of the finance committee.

Following the ceremony, Fairless announced appointment of Alden G. Roach as president of Columbia Steel, suceeding J. Lester Perry. Perry was due for retirement when he took the presidency of Columbia on the death of W. A. Ross. He will, however, continue with the company in an advisory capacity. Roach, who has been president of Consolidated Western Steel, will continue in that capacity in addition to his other duties.

● WILLIAM S. STEWART has been promoted to the position of Western regional manager and W. H. REEDY to the position of southern regional manager of the electrical division of Olin Industries Inc., New Haven, Conn. Newly appointed salesmen of the company include Robert L. Kingsley, Salt Lake City; Ed. J. Spanier, Portland; Fred J. Brown, Pasadena; Karl W. Mortensen and Phillip R. Crocker, San Francisco.

● C. W. JAGGS, general manager of Robert Simpson Eastern Ltd. at Halifax, has been named general manager of the British Columbia operations of the company. Robert Simpson Ltd. has also formed a subsidiary company known as Robert Simpson Pacific Ltd., which will handle British Columbia operations.

● PHILIPS B. PATTON, previously West Coast sales and engineering representative for the mobile communications division of Farnsworth Television & Radio Corp., has joined Lenkurt Electric Co., San Carlos, Calif., as a field engineer in the carrier division.

● GRANT WHITAKER sold his interest in the electrical contracting firm of Manning & Whitaker Inc. to Gil Wood and Stanley Fitschen, both of whom have worked for the firm. The firm name will remain the same.

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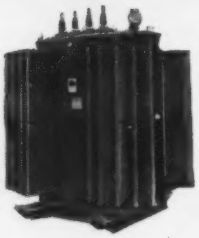

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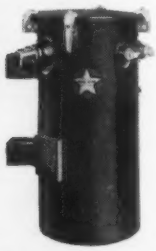
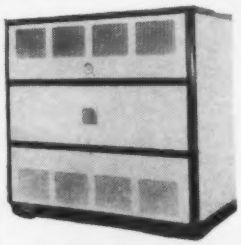
667 to 50,000 KVA
Up to 165,000 volts



DISTRIBUTION
3 to 500 KVA
Up to 66,000 volts



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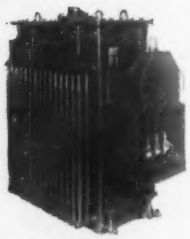

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give him a **bigger bonus**

without budging your budget!

Sure he's happy—and you are, too.

He was expecting a $75 bonus. Then you decided to give the bonus in U. S. Savings Bonds. So he receives—not $75—not a $75 Bond—but a $100 Bond.

It looks like more—and it *is* more. Not just because every $3 put into Savings Bonds will pay $4 at maturity. These Bonds are builders of future security for employees and for the nation as well (which means for business). They're a powerful weapon against inflation. They make employees "holders of shares in America"—thus build enthusiasm for our traditional competitive system.

They pay *your company* a bonus, too—in increased employee contentment, which shows up as less turnover, reduced absenteeism, fewer accidents! All these benefits are being proved and re-proved every day in thousands of companies that operate the Payroll Savings Plan—the popular plan for the regular purchase of Savings Bonds by employees.

You're helping your employees, your country, and yourself by deciding to...

give the bonus in Bonds

...and by putting plenty of push behind the P. S. P. It's easy with the help you get—for the asking—from your State Director, U. S. Treasury's Savings Bonds Division. Call him now!

The Treasury Department acknowledges with appreciation the publication of this message by

ELECTRICAL WEST

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.

Aluminum Foil to Be Manufactured in West

Aluminum foil will soon be added to the list of products manufactured in the West. Permanente Metals Corp. is now reactivating its Permanente, Calif., plant as a light metals operation by installation of an aluminum foil mill at that location. Permanente purchased the facilities of an entire German foil mill and had the machinery shipped to this country. Equipment is being overhauled and the plant is expected to be in operation by late spring of next year.

All of the initial phases of foil production will be performed at the company's Spokane rolling mill. The metal will be alloyed, poured into ingots, and rolled into sheet of very thin gage which will be shipped to Permanente for final foil processing. The plant will be capable of producing such end products as labels printed in colors, protective packaging for foods, tobacco, chewing gum and candy, wrappings for medical supplies, and foil used in the manufacture of electronic, radio, refrigeration and air conditioning equipment. About 1,500 kw. will be required.

The new plant represents another phase in Permanente's program to fully integrate its aluminum enterprise in the West and make available all types of aluminum products.

● O. B. WILT, manufacturer's representative, Western Merchandise Mart, San Francisco, has been appointed representative for the eleven Western States for the Tub-O-Wash, manufactured by Victor Electric Products. Wilt has appointed the following distributors to handle this new portable washing machine line: Associated Radio Distributors, 1251 Folsom St., San Francisco; Martin Distributing Co. Inc., 2618 Tulare St., Fresno; N. Schneider Co., 1009 S. W. Fifth Ave., Portland; Reliable Appliance Inc., 1248 Wholesale St., Los Angeles.

● BROWN-JOHNSTON CO. of Spokane has announced appointment of Thomas N. Hunt as its industrial engineer, a new position. Hunt, a graduate electrical engineer of Washington State College, previously had been with Washington Water Power Co. as industrial engineer and Spokane sales manager. He also worked with Westinghouse and Commonwealth Edison Co.

● APPOINTMENT of D. E. PERRY to the field sales organization of Telechron Inc. has been announced by Harold E. Blackburn, field sales manager. He will make his headquarters in Los Angeles and cover the southern California territory.

● KINGSWAY ELECTRIC Ltd., Vancouver, B. C., has incorporated with authorized capitalization of $25,000. The firm has registered offices c/o Fraser, Paine and Edmonds, 716 Stock Exchange Bldg., 475 Howe St.

● RICKETTS - SEWELL ELECTRIC has moved to a new location at 1169 Richard St., Vancouver, B. C.

● WALTER G. FENN and G. GORDON YOUNG have registered their partnership in the business of Fenn Electric at Mission City, B. C.

William Shalda, vice-president of S&M Lamp Co, Los Angeles; Jim Shirreffs Jr., plant manager; A. L. Varenhorst, secretary-treasurer, look over new press recently installed in company's plant at 119 W. 36th Place, Los Angeles

● R. A. REED ELECTRIC CO., Los Angeles, has incorporated with officers R. A. Reed, president; R. L. Bogardus, vice-president and general manager; O. I. Lamoreaux, secretary-treasurer.

● KENT's Ltd., music, radio and electric appliance merchant of Victoria, B. C., has moved into a new store at 742 Ford st.

● ALEXANDER FRITZ has registered partnership in the business of the Royal City Electric at New Westminster, B. C.

● SID THOMPSON LTD. has opened a new radio and electrical appliance showroom at 816 W. Pender St., Vancouver, B. C.

● ROLAND KINGSTON has joined the staff of Forst's Ltd., Vancouver, B. C.

● HAUCK & FOWLER, it is now, as Ernest Hauck and M. L. Fowler join forces as manufacturers agents in San Francisco. They represent the Pittsburgh Reflector Co. for northern California and western Nevada.

● DON A. DAVIS, sales manager of Cannon Electric Development Co., Los Angeles, recently announced the appointment of Henry Yates Satterlee to the company's factory sales engineering staff.

● J. WILLLIAMSON has been appointed British Columbia branch manager for Reliance Distributors Ltd., Vancouver, B. C., which has taken over the business of the Northland Automatic Appliances.

● B. C. ELECTRICAL REPAIR, Vancouver, has opened showrooms and service quarters on Granville St. in Vancouver.

● BETTS ELECTRIC LTD., Penticton, B. C., has taken over premises immediately adjoining its present store. The company handles electrical appliance sales and service and contracting business.

● LEROY APPLIANCE CO. will move into new quarters in Penticton, B. C., in the immediate future, it has been announced. The firm is headed by H. N. LeRoy and will feature appliances

● J. R. AND C. W. CONRAD, brothers, announce the opening of a new electrical equipment and contracting store in Veradale, Spokane suburb.

● LENKURT ELECTRIC CO., San Carlos, Calif., manufacturer of carrier telephone and telegraph equipment, has announced that it has transferred a substantial minority interest to Automatic Electric Co., Chicago. Since the founding of Lenkurt in 1934, Automatic has been the principle distributor of that company's products.

DIRECTORY ADDITIONS

DIRECTORY OF MANUFACTURERS

FULLERTON MFG. CORP., South Norwalk, Conn.—Robert Carr, c/o Illuminescent Products, Inc., 926 Natoma St., San Francisco.

LIGHTING, INC., Los Angeles, Calif.—Jerry Granniss, c/o Illuminescent Products, Inc., 916 Natoma St., San Francisco.

BLACKBURN *Jiffy Lift* HOIST & PULLER

It's New!

...and the Handiest Thing Yet for Lifting or Pulling!

LIGHTEST! Complete hoist weighs less than 12 lbs., yet has ¾ ton capacity.

SIMPLEST! Only one control for Up and Down and automatic Free-wheeling—By far the easiest to operate.

FASTEST! Easy to rig—quick to use—operator can also vary lift per stroke. High efficiency means less fatigue.

8 Important Features:

1. **Universal Operation—Handle operates on either side for lift or pull.**
2. **Positive Pawl Action—A ratchet type hoist—No friction brake to slip.**
3. **Self-Lubricating Chrysler Oilite oil cushion bearings used throughout.**
4. **Super-Strong Chrome nickle molybdenum steel sprocket shaft.**
5. **Heat Treated Aluminum housing and lever—the same high strength alloy used extensively in aircraft because of its lightness and durability.**
6. **High Strength Chain—Every chain proof-tested to 2½ times rated capacity of hoist.**
7. **Forged Steel Hooks—Normalized for ductility and safety.**
8. **Factory-Tested—Every hoist fully tested to 100% overload before shipment.**

The Jiffy-Lift is Ideal for:

Tightening Guy Wires
Pulling Cables and Messenger Wires
Skidding or Lifting Heavy Equipment
Lifting in Close Quarters
In Short, Any Lift or Pull

ORDER FROM YOUR JOBBER, OR WRITE FOR ILLUSTRATED FOLDER

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JASPER BLACKBURN PRODUCTS CORP.

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PROFILES

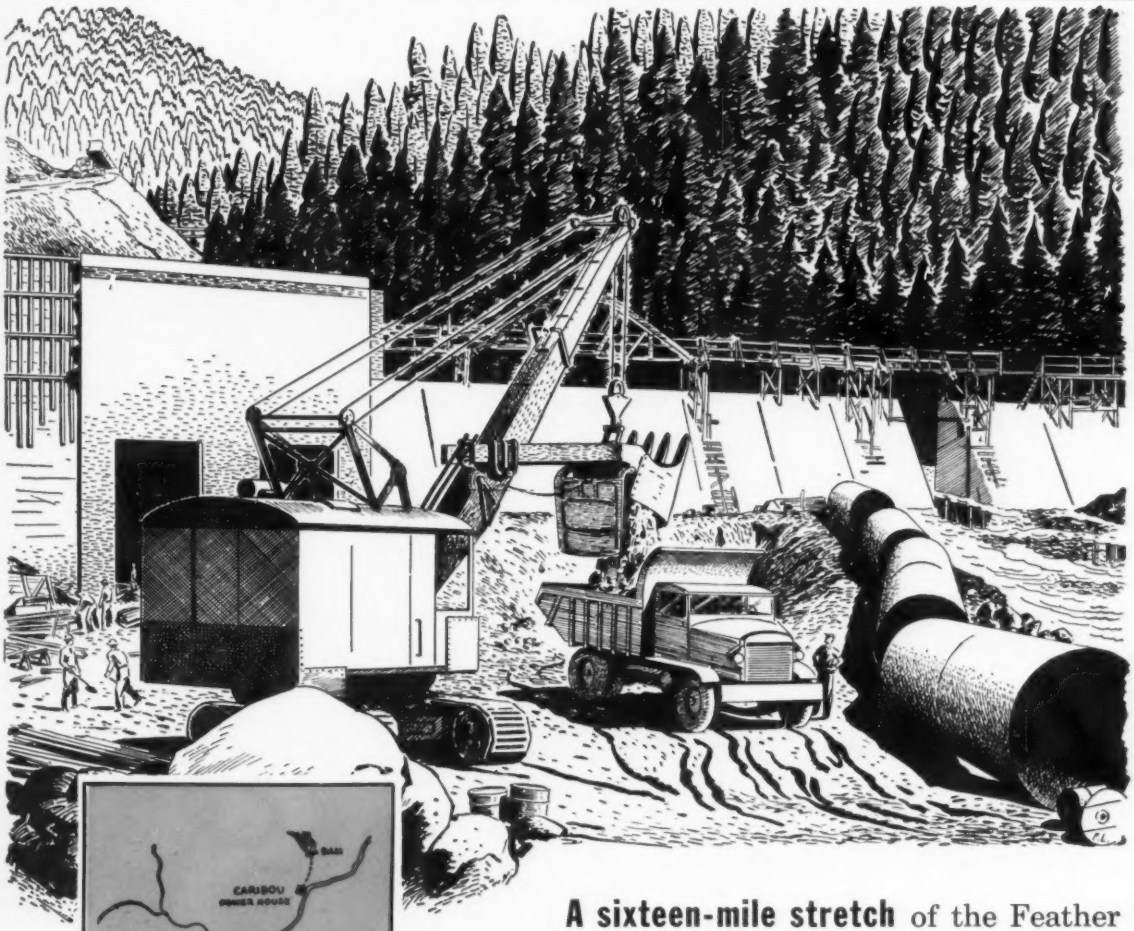
John Thomas Carey, chief inspector of Honolulu, brought sugar cane hats and leis from Honolulu and tried them on Herb Ufer, IAEI Southwestern Section secretary, for size, seeking to bring the next annual meeting to Honolulu

A charter for the new chapter of the Illuminating Engineering Society in Sacramento is being handed Al Purdue, Sacramento Municipal Utility District, its chairman, by Dr. Leland Brown, Stanford, regional vice-president. H. H. Robison, chairman of the Northern California Section of IES, presided

Two wheelhorses of the inspectors association from southern California, Larry Trim, Burbank, and Art Veit, Los Angeles county chief inspectors (left), past presidents of the Southwestern section. Trim handled code panel discussion at the recent Oakland meeting. Veit is now third vice-president of IAEI

At the close of the convention of the International Association of Electrical Inspectors at Oakland, Harry Moore, Modesto, retiring president, left, turned over the gavel to Jesse K. Ross, San Bernardino inspector, the new president (center). Seated at right is E. V. Muller, California State Dept. of Industrial Safety, elected second vice-president of the Southwestern Section of IAEI

Construction crews rush two new Feather River power plants



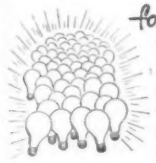
Map shows location of the two new plants — Rock Creek and Cresta . . . along with three already built. A system of several dams and powerhouses like this one is an extremely efficient power producer and helps conserve water for irrigation.

A sixteen-mile stretch of the Feather River will soon be turning out 270,000 new electrical horsepower for Northern and Central California. Two new dams, two new powerhouses and tunneling are already well underway... and when they are completed, still more waterpower will be harnessed.

Work never stops on our power-building program

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY



for the record

These two new dams and powerhouses will generate enough power to light 2 million 100 watt light bulbs.

But they're only part of a giant power-building program that will step up P.G. and E. capacity nearly 2 million horsepower.

This program—largest in America—has created 6,000 new jobs.

EW III - 1148

Good Lighting ...Good Business for Littleman

Mr. Littleman of San Francisco has a little neighborhood store. Business was dropping off.

Mr. Little modernized his store front... dramatized it with light. Business came back.

A neighborhood electrical contractor installed simple, effective lighting. Lighting level was raised from 2 f. c. to 60 f. c.

Look over your neighborhood for store lighting jobs whether for a little man or a big one. Stake out your claims on a series of jobs. Now is the time to do it when business is at its best during the holiday season. Ask your local power company for assistance on any lighting problem.

PACIFIC COAST ELECTRICAL ASSOCIATION

447 SUTTER STREET, SAN FRANCISCO 8 • 601 WEST FIFTH STREET, LOS ANGELES 13